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Tongass Land Management Plan Revision

Draft Environmental Impact Statement

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TONGASS NATIONAL FOREST

LAND MANAGEMENT PLAN REVISION

ALASKA

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Abstract: This Draft Environmental Impact Statement has been prepared for the revision of the Tongass Land Management Plan. It describes alternatives for managing the resources and uses of the Tongass National Forest, and discloses the potential environmental effects of implementing those alternatives. The revised Tongass Plan will direct all land management activities in the Forest. It will identify what land is to be managed for the different uses, and how the environment will be protected so these uses can be maintained.

Comments regarding this Statement should be sent to the Forest Plan Revision Office, at the address shown above, by September 28, 1990.

TONGASS FOREST PLAN REVISION

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CHAPTER 1

PURPOSE AND NEED

CHAPTER 1

PURPOSE AND NEED

INTRODUCTION

The 17-million acre Tongass National Forest, the largest forest in the National Forest System, was also the first to complete a Land and Resource Management Plan under the National Forest Management Act. The first revision of this plan is now being considered. This environmental impact statement documents the environmental analysis for this revision, as required by the National Environmental Policy Act.

Land and resource management planning is a process for developing, amending, and revising land and resource management plans (forest plans) for each of the National Forests in the National Forest System. Land management plans are required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The NFMA regulations require that forest plans be revised on a 10-15 year cycle (or sooner if needed).

The Tongass National Forest Land Management Plan was adopted in 1979, and amended in 1986. Because of changing values and increasing competition for the resources of Southeast Alaska, the Regional Forester for the Alaska Region initiated a plan revision in 1987. This draft Environmental Impact Statement (DEIS) analyzes in detail seven proposed alternatives for future management of the Tongass National Forest.

The actions preceding issuance of this DEIS have included identifying public issues (discussed later in this chapter and in Appendix A), developing criteria (guidelines) to use in assembling and analyzing data and information, and collecting and analyzing this data. This resulted in an "analysis of the management situation" which examines in detail the historical trends, current situation, and supply and demand features of the resources and uses of the Tongass National Forest. (The Analysis of the Management Situation, Tongass National Forest, January 1990, is a separate document incorporated here by reference.)

The Analysis of the Management Situation concludes with "the need for change," which is a look at current management direction for the Forest in light of the public issues and resource information analyzed up to that point. Based on this analysis, it asks the question: "Is there a need to change or augment the existing direction?" Since the existing direction is the Tongass Land Management Plan, the need for change helps identify what needs to be changed in the current Forest Plan. The need for change, along with the public issues, defines the scope of the revision addressed in the DEIS.

The purpose of the revised Tongass Land Management Plan is to direct all resource management activities on the Forest. While the Forest Plan is expected to guide management of the Tongass National Forest for the next 10 to 15 years, the analysis in this DEIS covers a planning horizon of 50 years to display the potential long-term effects of the alternatives.

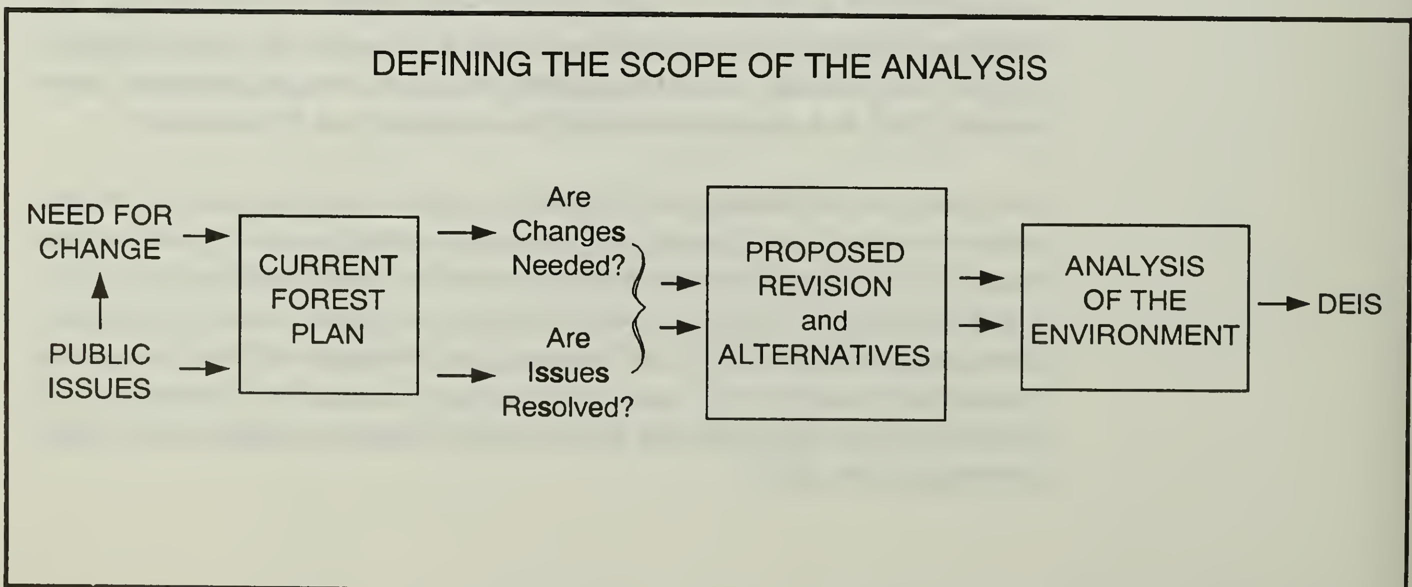
This environmental impact statement (EIS) is tiered to the EIS for the Alaska Regional Guide, which establishes Regional standards and guidelines and distributes targets from the Resources Planning Act program to the forests. Environmental analysis for projects will in turn tier to this, the Revised Tongass Land and Resource Management Plan EIS.

Following public review and analysis of public comment on this DEIS, a final Environmental Impact Statement (FEIS) will be prepared. The Regional Forester, in a Record of Decision, will select an alternative from the FEIS which will become the Tongass Forest Plan. Once adopted, the revised Forest Plan will supercede all current Tongass Forest Plan direction.

A separate letter enclosed in the DEIS summary describes the Regional Forester's draft preferred alternative. Public comments on this DEIS (a response form is also included) will play a major role in shaping the final selected alternative for management of the Tongass National Forest.

The next two sections describe the need for change and the public issues. How they are used in formulating alternatives and defining the scope of the analysis is portrayed in Figure 1-1. Four additional sections help the reader better understand this document and the overall planning process: Organization of the Document, The Planning Record, Forest Location, and Implementation.

FIGURE 1-1



NEED FOR CHANGE

The need for change is based on the results of monitoring and evaluation, an assessment of current direction, resource supply potentials and projections of demand, and public issues and management concerns. Examples are: changes in market conditions or resource demands; shifts in public values; and new information about the Forest's resources and their interrelationships.

Six categories of planning direction from the current Tongass Land Management Plan that might need changing have been identified (Chapter 7: The Need for Change, The Analysis of the Management Situation, Tongass National Forest, January 1990). These are described briefly here. (*Please note:* the following concepts are explained in more detail in Chapters 2 and 3.)

1. **Multiple-use goals and objectives.** The goals and objectives of the Tongass Land Management Plan were developed in 1979, and updated in 1986. Forest management is dynamic, and changes in public views, resource uses and demands, and natural resource knowledge require frequent re-evaluation of multiple-use goals and objectives. Current pending national legislation for the Tongass is an example of changing public values that may lead to changes in resource goals and objectives.

2. **Management Prescriptions.** The Tongass Land Management Plan used four broad land designations to allocate land areas to different types of management (such as wilderness, or emphasis on timber production). Specific management prescriptions, which have become the standard in more recent Forest Plans nationally, were not used in 1979. Such prescriptions (groups of coordinated management directions applied to specific areas of land) need to be developed and evaluated for the Tongass.

3. **Standards and Guidelines.** Standards and guidelines specify how projects and activities are to be carried out to satisfy multiple resource needs. Standards and guidelines were not designated as such in the 1979 Tongass Plan. Resource management policies for projects and activities originated in the Southeast Alaska Area Guide, later becoming region-wide standards and guidelines in the Alaska Regional Guide. Standards and guidelines have been included in project implementation documents, and have been developed as a part of Regional direction in the form of handbooks, manual supplements and a Forest Plan amendment. The Tongass Plan revision provides an opportunity to aggregate this direction into a Forest-specific package, and to validate, update and add to these existing standards and guidelines.

4. **Timber Suitability.** Under the Tongass Land Management Plan, lands were made available for a variety of uses including timber production. For several reasons, determining the location of suitable lands for timber production (the "suitable" landbase) was found to be difficult. Revising the Forest Plan provides an opportunity to better identify suitable lands for timber management.

5. **Allowable Sale Quantity**. The current Tongass Plan established an allowable sale quantity (a decadal ceiling on the amount of timber that can be supplied). This quantity was designed to meet market demands in Southeast Alaska, and to provide a significant contribution to Southeast Alaska's employment and local community stability while meeting multiple-use resource goals.

   Demand for Southeast Alaska's timber is expected to remain high well into the 1990's. However, during the same period a decrease is likely in the timber supply from Native Corporation lands, putting a greater demand on National Forest timber to maintain timber-related employment. At the same time, in recognition of the needs of some non-timber resources, and in response to public issues, the maintenance or even reduction of current harvest levels needs to be considered. Both higher and lower allowable sale quantities need to be evaluated.

6. **Monitoring and Evaluation.** The Tongass Plan provided direction for monitoring and evaluation, primarily for monitoring development-related activities. A revised monitoring plan is needed to ensure that the revised management prescriptions and standards and guidelines are achieving the desired results.

PUBLIC ISSUES

In 1988, after extensive public involvement, the public issues were identified. (See Appendix A for a description of issue identification and a discussion of each issue.) Ten issues related to the Tongass Plan revision were condensed from over 600 responses of individuals, business persons, representatives of special interest groups, and officials holding positions in either State or community governments. The majority of these responses came from within Southeast Alaska. The ten issues are described briefly here.

Public issues change over time, and new or evolving issues may surface. Since the 1988 issue identification, the inventory and evaluation of potential additions to the National Wild and Scenic Rivers System has become important for the Tongass. Tentatively eligible rivers have been identified and are being considered in some of the draft alternatives.

Scenic Quality

WHAT AREAS OF THE TONGASS NATIONAL FOREST SHOULD BE MANAGED TO EMPHASIZE SCENIC RESOURCES?

The Tongass National Forest is a unique combination of land and marine environments that provides outstanding ocean, mountain and glacier scenery. This scenery alone attracts thousands of visitors each year, who view Southeast Alaska from cruiseships or ferries traveling the popular Inside Passage water route.

Tourism has become a major industry in Southeast Alaska, similar to timber harvest and commercial fishing in the number of people directly employed. Tourism has helped diversify economies of some communities. The Forest's outstanding scenery also provides the backdrop for local living and recreation.

Maintaining the scenic quality of the Forest landscape, and how this is to be achieved in combination with resource uses that alter natural landscapes, such as timber harvesting and road construction, is of concern to Forest visitors, individuals, groups, businesses and communities.

Recreation

WHAT AREAS SHOULD BE MANAGED TO EMPHASIZE RECREATION OPPORTUNITIES?

Dense spruce and hemlock forests, active glaciers, abundant fish and wildlife, and miles of protected waterway, combined with the vast size and remote character of the Forest, provide a truly unique natural setting. Roads and trails are few and tend to be concentrated around communities.

Outdoor recreation opportunities offered by the Tongass National Forest play an important role in the quality of life for the majority of Southeast Alaska residents. Many families have favorite places where they fish, hunt, beachcomb, hike, or just go to get away.

Forest management has the potential to alter some of these unique recreation settings, raising the question of the compatibility of activities such as timber harvesting with the recreation opportunities that these settings provide.

Fish Habitat

WHAT METHODS SHOULD BE USED TO PROTECT RESIDENT AND ANADROMOUS FISH HABITAT?

The fisheries resource of the Tongass contributes significantly to the economic, recreational, and subsistence needs of residents and non-residents alike. Most of the salmon caught in the waters of Southeast Alaska and in the Gulf of Alaska, originate in streams and lakes lying within the boundaries of the Tongass National Forest.

Stream habitat provides shelter, hiding places, food, and rearing areas for Alaska's salmon. Changes in stream habitat can alter a stream's ability to produce fish. The level of protection necessary to maintain or enhance the fisheries resource, while allowing other resource activities such as timber harvest, is the focus of this issue.

Wildlife Habitat

WHAT AMOUNT OF OLD-GROWTH AND UNDEVELOPED HABITAT SHOULD BE MANAGED FOR THE PROTECTION OF WILDLIFE?

The Tongass National Forest supports a wide variety of wildlife species, including the largest populations of brown bears and breeding bald eagles in the world. The Tongass is also unique with its many marine mammals and seabird colonies. Many species, which are endangered elsewhere in the United States, are abundant in the Tongass.

Alaskans and visitors engage in sport hunting of moose, brown and black bears, mountain goat, and deer, as do subsistence users. Many species of furbearers, waterfowl, upland game birds and small game also provide the public with sport, commercial, and subsistence use opportunities. Demand is also growing for opportunities to watch and photograph wildlife.

The habitat needs of the wildlife species of the Tongass, the majority of which are associated with old-growth forests, must be integrated with the management of other resources. Old-growth forests of the Tongass also contain much of the high-value timber resource. The issue is how to manage forested habitats for competing wildlife and timber uses.

Subsistence

WHAT SHOULD THE FOREST SERVICE DO TO CONTINUE PROVIDING SUBSISTENCE OPPORTUNITIES?

Subsistence is hunting, fishing, trapping and gathering natural resources to provide needed food, and often to supplement rural incomes. For Southeast Alaska's Native Americans, subsistence is much more: it is a lifestyle that preserves cultural customs and traditions, reflecting deeply-held attitudes, values, and beliefs.

Because both commercial fishing and timber harvesting employment opportunities are seasonal and cyclical, subsistence use of resources is important to many Southeast Alaskans. Land-disturbing activities can provide new access opportunities, which can in turn result in competition among sport and subsistence users. Some subsistence users like the new access; some do not.

As with many of the other issues, the subsistence issue revolves around ensuring subsistence opportunities and protecting traditional subsistence areas while managing for multiple resource uses.

Timber Harvest

WHAT AREAS OF THE TONGASS SHOULD BE MANAGED TO EMPHASIZE TIMBER HARVESTING?

In the 1950's, establishing an Alaskan timber processing industry was encouraged to promote stable year-round employment. To make this proposal economically viable, long-term timber sale contracts were established.

Congress helped ensure a supply of timber to the purchasers of these contracts and to independent contractors when it passed the Alaska National Interest Lands Conservation Act (ANILCA) in 1980. ANILCA provided for the availability of 4.5 billion board feet of timber each decade from the Tongass National Forest; this is the decadal ceiling allowed under the current Tongass Land Management Plan.

The issue of where to emphasize (or allow) timber harvest is many-faceted, and includes consideration of the compatibility of timber activities with other resource uses and needs, the identification of lands suitable for timber management, and the question of what is an appropriate, sustainable level of timber harvest - all in combination with the local economic importance of timber-related employment.

Roads

WHAT ROAD SYSTEM SHOULD BE DEVELOPED IN THE TONGASS NATIONAL FOREST?

The land transportation system in Southeast Alaska has evolved almost entirely from the need to access areas for timber harvest. Some of these roads linking island communities have more recently been upgraded and incorporated into the State Highway System, a trend expected to continue in the future. In some areas, such as Prince of Wales Island, transportation networks have been developed between log transfer facilities (used to transfer logs from land to water transport) and existing communities.

Roads have also become a popular means of access for recreation, hunting and subsistence uses. On the other hand, roads can adversely affect scenic quality, wildlife habitat, unroaded recreation, and other aspects of a natural environment. Future road development will still be primarily in support of timber management. The benefits and drawbacks to extending the road system in the Tongass need to be analyzed.

Minerals

WHAT AREAS AND ACCESSIBILITY SHOULD BE EMPHASIZED FOR EXPLORATION, DEVELOPMENT, AND PRODUCTION OF MINERAL RESOURCES?

The Tongass National Forest contains immense mineral resources. Minerals that occur on the Forest range from precious metals to chemical-grade minerals. Mining and mineral exploration are not new to Southeast Alaska. In fact, mining

activities have occurred for over one hundred years. Today, along with new explorations, many historical mineral deposits are being revisited. This renewed interest in mining could, directly or indirectly, provide a significant increase in employment in Southeast Alaska.

While mining is allowed under most categories of forest management, those that emphasize natural settings and undeveloped areas would be more restrictive: in the case of designated Wilderness, mineral development may not be allowed. The identification of areas with high mineral development potential, and assuring development opportunities where appropriate, are the major facets of this issue.

Roadless Areas

WHAT AREAS AND WHAT AMOUNT OF ROADLESS LANDS SHOULD BE RECOMMENDED FOR WILDERNESS DESIGNATION OR OTHER TYPES OF UNROADED MANAGEMENT?

One of the major issues identified in the 1979 Tongass Land Management Plan related to how much land and which areas should be formally designated as Wilderness. Some organizations and individuals considered Alaska to be one of the Nation's last opportunities to preserve large tracts of lands that were relatively untouched by human activity. Others felt that resource development should be permitted and that Wilderness designation would only "lock-up" valuable resource development opportunities.

Approximately 5.5 million acres of the Tongass were added to the National Wilderness Preservation System in 1980 (by the Alaska National Interest Lands Conservation Act). Today, with the abundance of unroaded lands in the Tongass, the amount and location of possible additional Wilderness continues to be an issue. Several roadless areas have been identified by the public, or in Congressional proposals, for consideration as wilderness. There are also opportunities to apply other types of management to these areas and still maintain their roadless character and values.

The issue centers on the question of how much roadless land to maintain in its natural condition, versus the development of these lands for their timber and mineral values.

Local Economy

WHAT WAYS SHOULD NATIONAL FOREST LANDS BE MANAGED TO PROVIDE FOR THE LOCAL LIFESTYLES OF SOUTHEAST ALASKA COMMUNITIES?

Employment and income generated by the government sector, timber, fishing, mining, and tourism industries is critical to the social and economic well-being of existing and emerging Southeast Alaska communities. Some individuals also rely

on subsistence use of Forest resources to provide needed food which is supplemental to their income. In some situations, a positive increase in the development of one industry or lifestyle may negatively affect another.

Dependency on the land and natural resources as part of one's livelihood is an economic fact of life throughout much of Southeast Alaska. Because of this dependency, management of the Tongass National Forest has been, and continues to be, closely tied to the issue of regional and community socio-economic development and structure. Minor changes in Forest programs can sometimes cause major changes in community lifestyles; but maintaining current employment, especially in the timber sector, will require the development of more areas of the Forest.

ORGANIZATION OF THE DOCUMENT

This draft environmental impact statement is organized into several chapters and appendixes. A *Summary* is published separately. *Chapter 1, "Purpose and Need,"* describes the reasons for proposing a plan revision. *Chapter 2, "Alternatives,"* describes the process used to develop alternatives, explains what the components of a Forest Plan are, discusses alternatives not considered in detail, and then describes in detail seven alternatives. Chapter 2 also includes comparisons of these alternatives based on the public issues and significant environmental effects.

The discussions of the "Affected Environment" and the "Environmental Consequences" are combined in *Chapter 3*, *"Environment and Effects."* This is done so that the environmental consequences (effects) of the alternatives on forest resources, and the background information needed to understand these consequences, are discussed together for each resource. The focus will be on significant effects, with the analysis centered on the public issues. The chapter begins with a general description of the Tongass National Forest.

The document also includes a list of preparers, a list of agencies, organizations and persons receiving copies of the document, a bibliography, and a glossary (Chapters 4 through 7), and an index. Appendices give more background on planning actions (such as identifying issues), certain resources (such as roadless areas), and analysis and modeling techniques. Three appendixes also include the detailed proposed Forest Plan revisions for management prescriptions (Appendix F), Forest-wide standards and guidelines (Appendix G), and monitoring requirements (Appendix H). These three appendices are the primary material that will become the Revised Forest Plan.

THE PLANNING RECORD

Additional information, maps and documents used in the Tongass National Forest Land Management Plan revision process are contained in the planning record. These may be reviewed at the Tongass Plan Revision Team Office, 8465 Old Dairy Rd., Juneau, Alaska, during regular business hours. The planning record in its entirety is incorporated here by reference.

FOREST LOCATION AND DESCRIPTION

The 17-million acre Tongass National Forest is located in Southeast Alaska, a part of the Alexander Archipelago, and occupies about seven percent of the State's area. The Tongass extends from Dixon Entrance in the south to Yakutat in the North, and is bordered on the east by Canada and on the west by the Gulf of Alaska. It extends approximately 500 miles north to south, and approximately 120 miles east to west at its widest point. Figure 1-2 is a vicinity map of the Tongass.

Southeast Alaska includes a narrow mainland strip of steep, rugged mountains and icefields, and over one thousand offshore islands. Together, the islands and mainland equal nearly 11,000 miles of meandering shoreline, with numerous bays and coves. A system of seaways separates the many islands and provides a protected waterway called the Inside Passage. Federal lands comprise about 95 percent of southeast Alaska, with about 80 percent in the Tongass National Forest (and most of the rest in Glacier Bay National Park). The remaining land is held in State, Native and private ownerships.

Most of the area of the Tongass is wild and unpopulated. About 65,000 people inhabit Southeast Alaska, most living in 33 communities located on island or mainland coasts. Only eight of the communities have populations greater than 1,000 persons. Just three towns are connected to other parts of the mainland by road: Haines and Skagway to the North, and Hyder to the south.

The economies of Southeast Alaska's communities are largely dependent on the Tongass National Forest to provide natural resources for uses such as fishing, timber harvesting, recreation, tourism, mining and subsistence. Maintaining the abundant natural resources of the Forest while also providing opportunities for their use is a major concern of Southeast Alaska residents.

Because of its immense size, the Tongass National Forest is divided into three Administrative Areas, each with its own Forest Supervisor: the Chatham Area with its Supervisor's Office at Sitka, the Stikine Area with its Supervisor's Office at Petersburg, and the Ketchikan Area with its Supervisor's Office in Ketchikan. Figure 1-3 shows the three Administrative Areas, and their nine Ranger Districts and two National Monuments. Ranger District offices are located in Yakutat, Juneau, Hoonah, Sitka, Petersburg, Wrangell, Thorne Bay, Craig, and Ketchikan; National Monument offices are located in Juneau and Ketchikan.

FIGURE 1-2
TONGASS NATIONAL FOREST VICINITY MAP

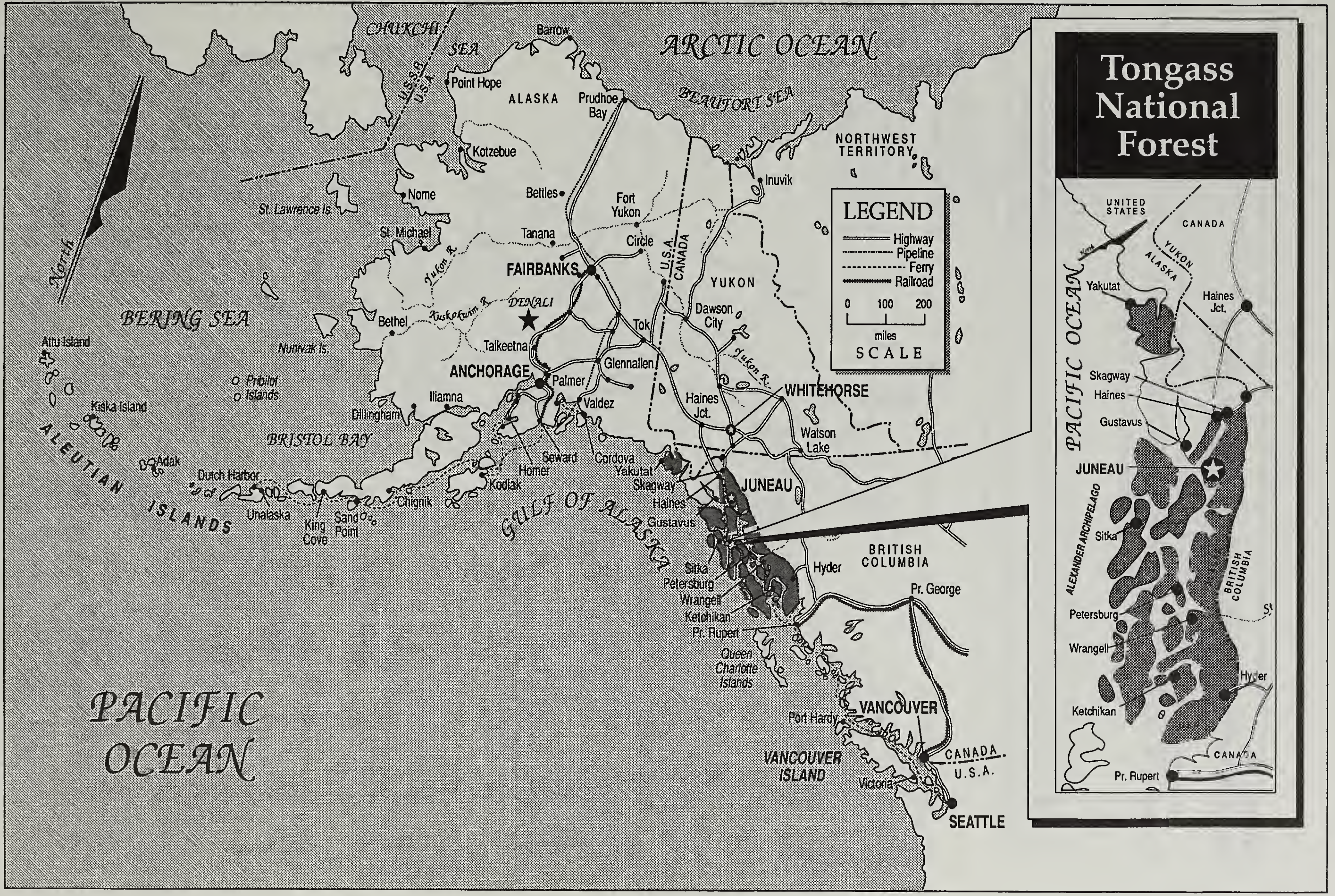
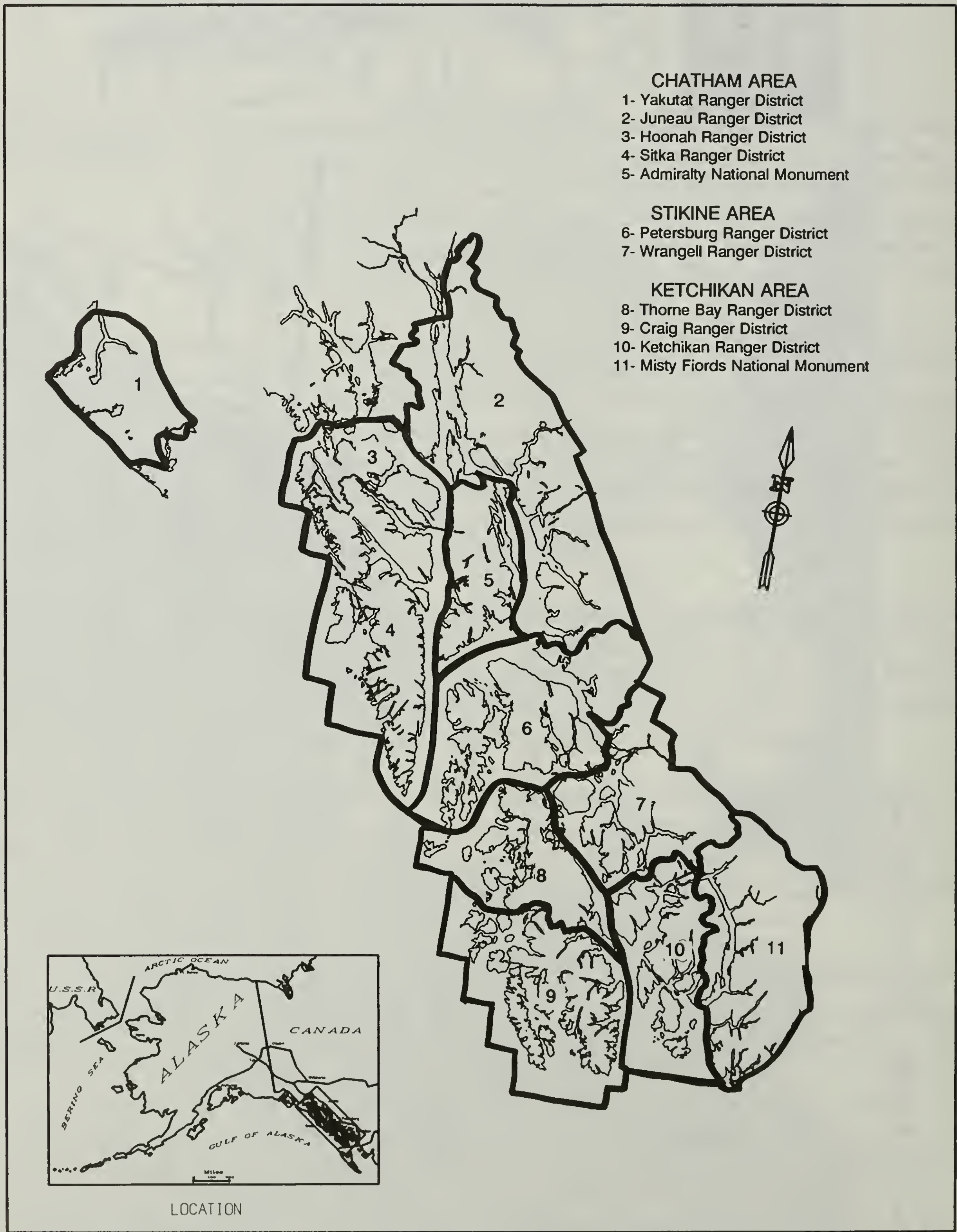


FIGURE 1-3
TONGASS NATIONAL FOREST ADMINISTRATIVE AREAS



IMPLEMENTATION
The Two-Step Planning Process

Land and resource management plans (Forest Plans) provide broad, programmatic direction for management of a National Forest. This direction is in the form of multiple-use goals and objectives, area-specific management prescriptions, and standards and guidelines to be applied to individual projects. Forest plans normally do not make site-specific decisions; that is the role of project-level environmental analysis.

The **first step** in the land management planning process is the Forest Plan, which determines land allocations, and provides requirements for site-specific decisions. The **second step** is the analysis of individual projects, which includes applying the standards and guidelines from the Forest Plan to site-specific activities.

Project-level decisions require site-specific environmental analysis. Common project-level decisions include whether or not, and if so, in what way, timber will be harvested, a campground will be constructed, or a fisheries structure will be installed. An environmental analysis document, such as an environmental impact statement or environmental assessment, precedes these decisions unless they are categorically excluded from documentation. Project-level planning provides an additional opportunity for public participation.

Amendments

When a change to the Forest Plan is needed, the Forest Supervisors will prepare an amendment and conduct an environmental analysis. Non-significant amendments may be approved by the Forest Supervisors. Significant amendments must be approved by the Regional Forester, and the development and approval of a significant amendment must follow the same procedures as were required for developing and approving the Forest Plan (or its revision). ("Significance" here is as defined by the National Forest Management Act regulations, and is different than significance as used under the National Environmental Policy Act.) Figure 1-4 briefly outlines this process.

The Forest Supervisors (the Tongass National Forest is divided into three Administrative Areas, each with a separate Forest Supervisor) may amend, or recommend to amend, the Forest Plan at any time. An amendment may result from:

1. Recommendations of an interdisciplinary team, based on results of monitoring and evaluation.

2. Decisions by the Forest Supervisors that existing or proposed permits, contracts, cooperative agreements, or other instruments authorizing occupancy and use are appropriate, but are not consistent with the Forest Plan.

3. Changes in proposed implementation schedules, resulting from differences between Forest Plan projected funding levels, and funds actually appropriated.

4. Administrative appeal decisions.

5. Planning errors found during Forest Plan implementation.

6. Changes in physical, biological, social or economic conditions.

The Forest Supervisors will determine whether proposed changes in the Forest Plan are significant or non-significant. If determined to be non-significant, the Forest Supervisors will document that determination in a decision document, and provide appropriate public notification prior to implementing the changes. If the change is determined to be significant, the decision about the change then rests with the Regional Forester, who will also prepare a decision document after environmental analysis.

Non-significant amendments to the Forest Plan can result from:

1. Actions that do not substantially alter the multiple-use goals and objectives for long-term land and resource management.

2. Minor adjustments to management area boundaries, management prescriptions, or Forest-wide standards and guidelines resulting from further site-specific analysis.

3. Short-term fluctuations in an implementation schedule or in planned annual outputs.

Significant amendments to the Forest Plan can result from:

1. Changes that have an effect on the entire Forest Plan, or that affect land and resources throughout a large portion of the planning area (for example, area-wide increases or decreases in resource demands).

2. Changes that would significantly alter the long-term relationship between the amounts of resource uses and Forest products originally projected (such as changes in implementation schedules resulting from sustained differences between proposed and actual budgets).

3. Major changes in management prescriptions or their allocations, or in Forest-wide standards and guidelines.

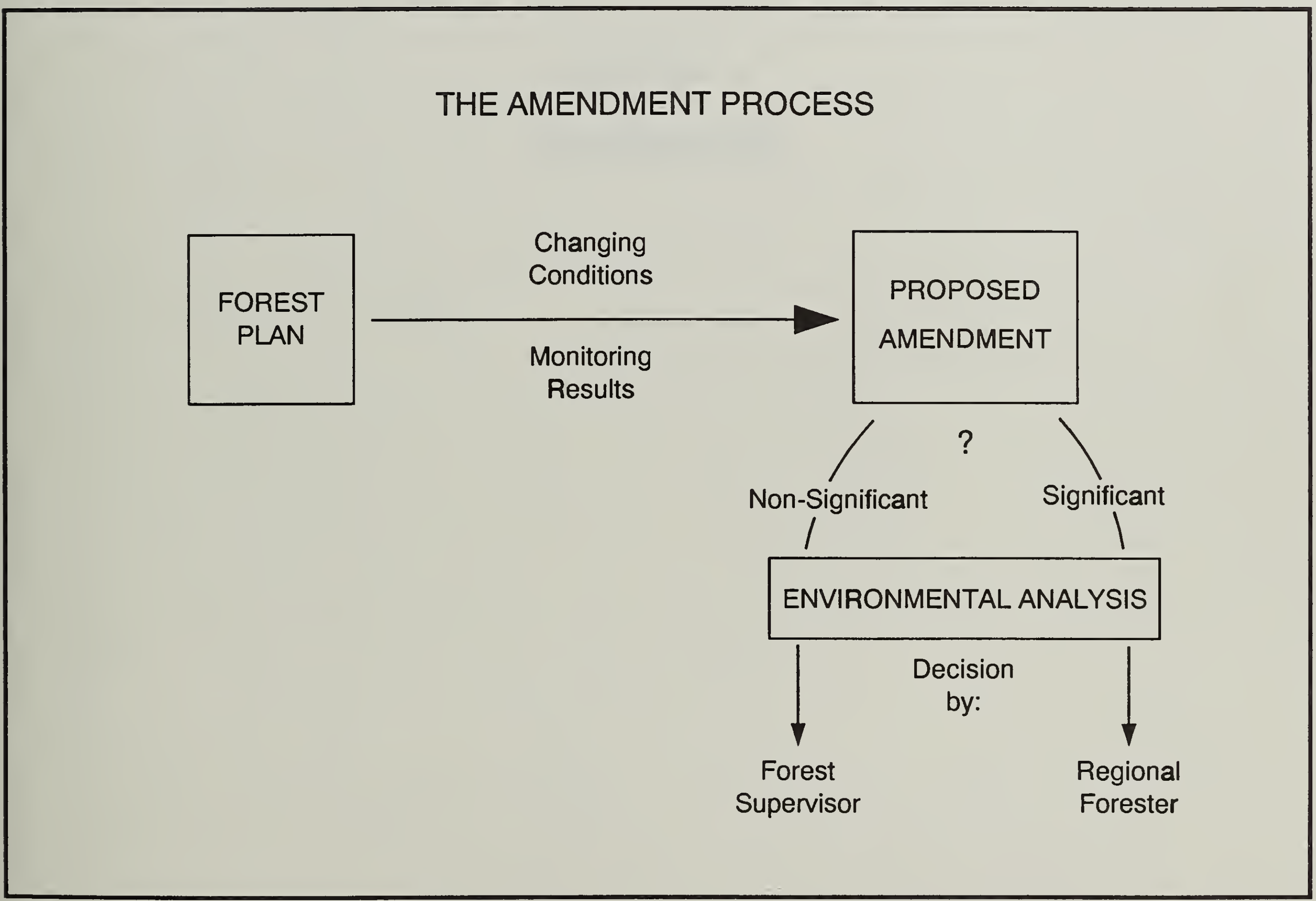
Revision

The Forest Plan will ordinarily be revised on a 10-year cycle, or at least every 15 years. It also may be revised whenever the Forest Supervisors determine that conditions in the area covered by the Forest Plan have changed significantly, or when changes in national policies, goals, or objectives would have a significant effect on Forest-level programs. In the monitoring and evaluation process, an

interdisciplinary team may recommend a revision (or an amendment) of the Forest Plan at any time.

Revisions are not effective until considered and approved in accordance with the requirements for the development and approval of the Forest Plan. The Forest Supervisors will review conditions in the area covered by the Forest Plan at least every five years to determine whether significant changes have occured. Revisions must be approved by the Regional Forester.

FIGURE 1-4



CHAPTER 2

ALTERNATIVES

CHAPTER 2

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ALTERNATIVES

INTRODUCTION

The Council on Environmental Policy Regulations for implementing the National Environmental Policy Act describe the alternatives section (this chapter) as "the heart of the environmental impact statement." Chapter 2 is divided into five parts: a discussion of how alternatives were developed; an explanation of what constitutes an alternative; a discussion of alternatives considered but eliminated from detailed study; a full description of the alternatives that are considered in detail; and a comparison of these alternatives.

Each of the seven alternatives considered in detail has a large-scale map showing the distribution of management prescriptions. These are included in the map packet accompanying this document. For ease of reading and brevity, the term "alternatives" will be used from now on to mean the alternatives considered in detail.

ALTERNATIVE DEVELOPMENT PROCESS

The alternatives were developed using several factors, including the public issues and need for change discussed in Chapter 1, and the benchmarks discussed later in this section. The current Tongass Land Management Plan (the no-action alternative) was the starting point, and is itself one of the seven alternatives (Alternative C; see map packet). How these factors were used to develop alternatives is the subject of this section.

Public Issues

Most of the ten public issues center around particular forest resources (such as wildlife habitat), public uses (such as recreation or subsistence), or management activities (such as timber harvest).

In responding to issues through alternative land management plans, questions such as "*how much*?", "*what*?" and "*where*?" can usually be answered in different ways. Land management planning may be compared to city, county or borough zoning. Just as areas in your community are zoned as commercial (allowing business uses), industrial (allowing factories) or residential (allowing only homes, schools, etc.), the forest is also "zoned" to allow, or not allow, various uses and activities. Land management zoning is done through the use of management prescriptions.

Management prescriptions are ways of managing an area of land and the resources it contains. Management prescriptions may emphasize certain resources (such as a prescription for Wilderness, or old-growth wildlife habitat), or combinations of resources (such as providing for scenic quality in combination

with timber harvesting). Management prescriptions include *practices* and *standards and guidelines*.

Practices are specific actions or treatments used in the management and protection of forest resources. As an example, even-aged timber harvest methods (clearcutting, for instance) are practices. Each prescription specifies which practices are allowed. Some prescriptions may allow all types of timber harvest methods, some may allow only salvage due to insect or disease damage, and some may not allow any timber harvest.

The prescription might specify, however, that timber harvest openings be limited to a certain size, or that the visible evidence of timber harvest be limited within frequently viewed areas. These would be *standards and guidelines*. Some standards and guidelines, such as those for protecting archaeological sites, apply to all prescriptions. These are called forest-wide standards and guidelines.

The prescriptions are assigned, or "allocated," to specified areas of land (see alternative maps in the map packet). Many of the prescriptions can be allocated differently (that is, assigned to different areas) depending on what issue or issues are being addressed. A given area of land will have only one prescription assigned to it under an alternative, although which prescription **is** assigned can vary by alternative. Prescription allocations respond to the "what" and "where" kinds of questions. The alternative maps can be viewed next to each other to see different ways of allocating prescriptions.

Forest products (such as timber) and resource uses (such as recreation) can be produced or made available in different amounts. How much timber to offer, or how many recreation users to provide facilities for, are questions that land management planning must also answer. Many resources, and many uses, may occur together in the forest, but some uses or activities are not compatible. It is not always possible to produce all the products and uses in the amounts desired.

For instance, in order to make available a high level of timber, it may not be possible to also provide for as many "undeveloped" recreation areas. Conversely, in an alternative where wildlife habitat is emphasized, timber harvest amounts may have to be lowered. "How much" of a given resource to produce or make available is another way to respond to issues by alternative. The discussion of the theme of each alternative begins in this Chapter under the subheading, "Alternatives Considered in Detail."

Finally, alternatives themselves are usually designed around a "theme" that emphasizes a particular issue (such as the local economy) or a group of compatible issues (such as scenic quality and wildlife habitat).

Table 2-1 lists the primary management prescriptions that were used to develop alternatives in response to public issues. It also indicates when standards and guidelines and other specific considerations were used to respond to issues. Under "scope," those aspects of an issue that were emphasized by the public are highlighted. This helps to define the "decision space" (or range) within which the issue needs to be addressed.

The comparison of alternatives section at the end of this chapter also discusses ways in which the alternatives address the issues.

Need for Change

The "need for change" discussed in Chapter 1 identified six general categories of land management planning direction that may need changing, based on the results of the analysis of the management situation. *Goals and objectives* are the broad direction statements that focus a plan on a particular theme or emphasis. The use of *management prescriptions*, and *standards and guidelines*, to respond to resource-related issues, has been discussed.

Timber suitability and *allowable sale quantity*, may be seen as ways to either respond to issues (the "where?" and "how much?" questions), or to management concerns over resource capability, and technical or economic feasibility. Timber suitability refers to the identification of lands where timber management may be practiced. Suitability depends in part on the allocation of management prescriptions that do not allow timber harvest; it also depends on the capability of an area to grow trees, either naturally or with the help of humans (reforestation), and on the economics of timber harvest. (Part of the determination of suitable lands does not vary by alternative, but has been updated from the current Forest Plan. Timber suitability is discussed in Chapter 3, "Timber" and in Appendix K.)

The allowable sale quantity (harvest level) also relates to the issues. It will vary by alternative according to whether the emphasis is on economic issues (usually a higher sale quantity), resource-protection issues (usually lower), or a mixture of both.

Finally, *monitoring and evaluation* is the method of keeping track of how all the previous categories are working over time, as the revised Forest Plan is put into practice. In this case, monitoring does not vary by alternative, but a revised monitoring plan is included in the proposed revision (Appendix H).

TABLE 2-1
CONSIDERATIONS USED TO DEVELOP ALTERNATIVES

Issue	Prescription Emphasis	Other Considerations	Scope
Scenic Quality	Scenic Viewshed, Wilderness, Primitive and Semi-Primitive Recreation, Visual Timber	Standards and Guidelines	Emphasize area viewed by local residents and tourists.
Recreation	Wilderness, Primitive, Semi-Primitive, and Roaded Natural/Rural Recreation.	Standards and Guidelines, Scenic Byways	Tourism and locally popular recreation areas.
Fish Habitat	Stream and Lake Protection, Fish Habitat and Water Quality Requirements	Standards and Guidelines, Improvement Projects.	The economic, subsistence, and recreational aspects.
Wildlife Habitat	Wilderness, Old-Growth Habitat, Beach Fringe & Estuary, Stream & Lake Protection	Standards and Guidelines, Improvement Projects	The amount of old growth needed for wildlife and other resource uses
Subsistence	Same as Wildlife	Standards and Guidelines	Providing for subsistence uses
Timber Harvest	Visual-Timber, Timber Production	Targeted Harvest Level	Local timber markets and demand determine "upper bounds."
Road System	Same as Timber, Roaded Natural/Rural Recreation	Standards & Guidelines	Emphasize support of other uses.
Minerals	Minerals		Emphasize access to areas with high potential.
Roadless Areas	Wilderness, Primitive, and Semi-Primitive Recreation		Consideration of wilderness for areas of high public support
Local Economy	Some combination of those under Timber, Minerals, Fish, Scenic, and Recreation.		Minimize local economic effects

The Benchmarks

"Benchmarks" are simplified versions of forest plans, similar to alternatives, that, like the alternatives, can be modeled mathematically and analyzed by use of a computer. The main difference between benchmarks and alternatives is in the level of detail, and in the single-resource emphasis of most benchmarks.

The computer model (called FORPLAN) has the ability to evaluate, select and schedule a large number of resources and their "outputs" as they interact with or affect each other over time. This is done by associating outputs (such as numbers of recreation users, or volume of timber) with units (acres, miles) of each management prescription. Output amounts can be specified for the model (such as setting the amount of timber to offer each decade), or selection can be left up to the model.

The full set of practices and activities that could be applied to the Forest were developed for use in the computer model. These are referred to as the FORPLAN prescriptions. The Forest was then divided into land units that would allow estimation of the resource outputs and costs associated with the FORPLAN prescriptions. These units, called analysis areas, were delineated based on physical and biological attributes such as vegetation type and slope.

For each analysis area, the full range of FORPLAN prescriptions that could be applied to an area considering site capability and suitability was then determined. Only those practices and activities that were feasible and would not cause permanent impairment of site productivity were identified as suitable.

The results of the computer "runs" for each alternative were evaluated to ensure that the allocation of prescriptions and schedule of resource outputs could be attained on the ground. Adjustments to the constraints were made, when necessary, to produce a feasible schedule of outputs and prescriptions meeting the theme and goals of each alternative.

The computer model selects and schedules outputs using economic criteria. (Output levels can also be pre-set to meet non-economic criteria.) Each forest product or resource use has benefits and costs associated with it. When outputs are not pre-selected, and after minimum requirements are met (such as maintaining viable wildlife populations), amounts of products and uses are selected that are the most economic to produce. (See the discussion of *present net value* under "economic comparisons" later in this section.)

Many resource uses also have a level of public demand identified. Once the demand for a particular resource is met (for instance, the amount of recreation capacity that will accomodate future recreation use), that resource will no longer be selected based on additional "benefits." In other words, it is assumed that no benefit comes from producing more of a resource than is predicted to be desired.

In addition, because it is not possible to assign dollar values to all Forest resource outputs and hence to include them all in the FORPLAN model, consideration was also given to non-quantifiable benefits and costs such as the diversity of wildlife and fish species, the quality of recreation experiences, and the value of cultural resources. The evaluation of net public benefits (i.e., the combination of quantitative and qualitative resource benefits) was the final criterion used to formulate alternatives (see further discussion in the Economic Environment section of Chapter 3).

This has been a very simplified explanation of how the computer model works. The computer model is essential to formulating, testing, analyzing and evaluating both benchmarks and forest plan alternatives. Appendix B discusses the modeling process in detail.

Three types of benchmarks were used for the Tongass Land Management Planning process:

a. those designed to identify the maximum capabilities of different forest resources (usually looking at one resource at a time);
b. those designed to examine economic factors such as opportunity costs (costs associated with limiting resource production to emphasize other resources, thus losing the "opportunity" to produce the maximum amount of a resource) and economic efficiency; and,
c. those designed to test various timber management options (such as differences in harvest system methods) in relation to timber offer levels and costs.

The benchmarks are not necessarily limited by Forest Service policy or current budgets. They are physically and technologically achievable, but have only the minimum requirements needed to maintain resource values. (These requirements are discussed in Appendix B.)

The benchmarks are too numerous (there were 24) to describe or discuss in detail here. Appendix B describes each one. Most of the economic-criteria benchmarks, those that identify the opportunity costs of management requirements, are not important for understanding the alternatives, since these requirements apply to all alternatives. Several of the timber policy benchmarks fall in the same category. These types of benchmarks are not discussed further.

Resource Potential

The benchmarks that portray maximum resource potentials define the "decision space" (the upper and lower limits) for the alternatives: all alternatives must have amounts of uses and forest products that fall within the ranges determined to be feasible by the benchmarks. These benchmarks can also indicate what must be "given up" (in terms of other resource uses or amounts) when a particular resource is emphasized. The maximum resource potential benchmarks included timber (first-decade timber harvest), fish (anadromous fish), recreation, wildlife (old-growth habitat) and wilderness potential (from existing unroaded areas). Table 2-2 includes selected outputs for these benchmarks. (Table 2-2 also includes an entry for "present net value," which is discussed later in this section.)

In terms of developing alternatives, the resource maximums from these benchmarks were:

a. The maximum first-decade annual harvest level could be as high as 780 million board feet.
b. Commercial fish habitat capability could be increased to about 117 million pounds per year during the first decade.
c. Recreation capacity could be increased to about 4.6 million recreation visitor days annually.
d. The maximum old-growth wildlife habitat that could be retained after the first decade is 8.7 million acres.
e. A maximum of 10.4 million acres of unroaded lands could be designated as wilderness.

TABLE 2-2
SELECTED BENCHMARK RESULTS

	BENCHMARKS					
	Maximum Wildlife	**Maximum Fish**	**Maximum Recreation**	**Maximum Timber**	**Maximum Wilderness**	**Maximum PNV**
UNIT OF MEASURE						
First Decade Average Annual Board Feet of Timber (millions)	40.0	580.0	370.0	780.0	150.0	580.0
Acres of Roadless Land Remaining (in millions):						
After 10 Years	15.8	15.5	15.5	14.8	15.9	15.5
After 50 Years	15.8	13.2	14.7	11.1	15.8	13.2
First Decade Capability to Produce Commercial Fish (in millions of pounds)	117.0	117.0	117.0	117.0	117.0	117.0
Acres of Old Growth Remaining (in millions)						
After 10 Years	8.7	8.5	8.6	8.4	8.6	8.5
After 50 Years	8.6	7.5	8.1	7.1	8.4	7.5
Recreation Visitor Days of Capacity (in millions)						
After 10 Years	4.3	4.2	4.3	4.2	4.3	4.2
After 50 Years	4.3	4.2	4.6	4.2	4.2	4.2
Present Net Value (in billions of dollars)	4.11	4.59	4.29	4.13	4.15	4.59

1/ PNV = Present Net Value

Relationships

Except for fish habitat capability, which did not vary by benchmark, these maximums just discussed cannot occur together, and achieving one usually meant reductions in others. Some results were:

a. The higher the timber harvest, the greater the reduction in roadless areas. Benchmarks with harvest levels at or higher than the average annual allowable sale quantity (450 million board feet) would result in a decline in roadless lands of at least 2.7 million acres after five decades (or 26 percent of the existing 10.4 million non-wilderness roadless acres). Roadless lands decline in the other benchmarks (except in maximum wilderness), but the amount is less.

b. The decline in roadless acres indicates that present harvest levels cannot be sustained on the lands currently roaded and being managed for timber; in fact, with no roadless acres converted to timber harvest, the allowable sale quantity for the first decade of the plan is only 150 million board feet annually, a reduction of 67 percent from the current level.

c. Old-growth-associated wildlife habitat is also reduced with higher levels of timber harvest. The decline over 50 years ranges from seven percent with a harvest level of 370 million board feet up to 18 percent with a harvest of 780 million board feet. With no new harvest in old growth, the average annual allowable sale quantity would only be 40 million board feet per year.

d. Riparian areas are not scheduled for timber harvest except in the maximum timber benchmark.

e. Recreation capacity remains higher than recreation demand in all benchmarks until the end of the fifth decade, where demand reaches 4.2 million recreation visitor days, the same as the lowest capacity. The maximum increase, under the recreation benchmark, is another 10 percent of capacity (from 4.2 to 4.6 million recreation visitor days); this results in a decline in allowable sale quantity of 18 percent.

Economic Comparisons

One important benchmark from the economic category is the "maximum present net value" benchmark. It uses the criteria of present net value to select the most economic mix of resource outputs. (*Present net value* is the current monetary value of all the resource uses, forest products and other benefits that an alternative could provide, with all the costs of producing or providing them subtracted out.) The results of this benchmark are also included in Table 2-2.

Present net value (PNV) can also be used to compare the benchmarks. Results of the maximum PNV benchmark, and this comparison, were:

a. The most "economically efficient" mix of resource activities (determined by the highest present net value) includes making available 580 million board feet per year, retaining 8.1 million acres of

non-wilderness roadless areas after five decades (a decline of 22 percent), retaining 7.5 million acres of old growth after five decades (down 14 percent), increasing fish habitat capability, and not changing recreation capacity by the end of the first decade.

b. PNV varies directly with the level of timber made available, declining as the allowable sale quantity either increases or decreases from the most efficient level (580 million board feet). The lowest PNVs correspond to the high and low ends of allowable sale quantities.

c. The maximum fish benchmark is identical to the maximum PNV benchmark. This indicates that all fish habitat improvements are economical, given the returns in increased fish production.

d. On the other hand, maximizing timber, recreation, wilderness, or old-growth-associated wildlife habitat results in decreases in present net value.

Harvest Methods

Another category of benchmarks included two which evaluated methods of timber harvest other than clearcutting. These used the same framework as the maximum present net value benchmark, except that different harvest methods were used. (See the glossary, or Chapter 3, "Timber," for an explanation of these methods.) Using the uneven-aged method of group selection, the allowable sale quantity was reduced in the first decade by 17 percent (from 580 to 480 million board feet annually), with a reduction in present net value of two percent. Extending the rotation period (the time from one harvest of the same acres to the next) to 200 years lowered the first-decade allowable sale quantity by 28 percent (to 420 million board feet annually) and present net value by two percent.

Resource Demands

Resource potential is a general indication of how much of a particular resource might be available. Resource demand gives an indication of how much of a resource might be needed or desired. In developing alternatives, demand can help narrow the scope within which alternative amounts (acres, output levels, etc.) of a resource need to be considered. Resource demands are discussed in Chapter 3 of this document. A few key points are summarized here.

a. *Fish* - The demand for commercial fish (about 95 percent of total demand) is expected to exceed current potentials for all species.

b. *Recreation* - Recreation use is predicted to increase from a current level of 2.8 million recreation visitor days to 4.2 million recreation visitor days by the fifth decade.

c. *Wildlife* - Hunting demand for old-growth-related game species is predicted to increase steadily over the next five decades.

d. *Timber* - Market demand is expected to remain strong over the next decade, with the share of National Forest timber expected to be at least two-thirds of the total harvest in Southeast Alaska.

e. *Wilderness* - Based on pending Congressional legislation, 1.8 million acres of inventoried roadless areas should be considered for wilderness designation.

Summary

Public issues, need for change, resource demands and potential, acknowledgement of resource tradeoffs, and economic factors were used to develop responsive alternatives.

ALTERNATIVE MAKE UP

Each alternative for the revision of the Tongass Land Management Plan will be presented in the same format. This format includes the following components:

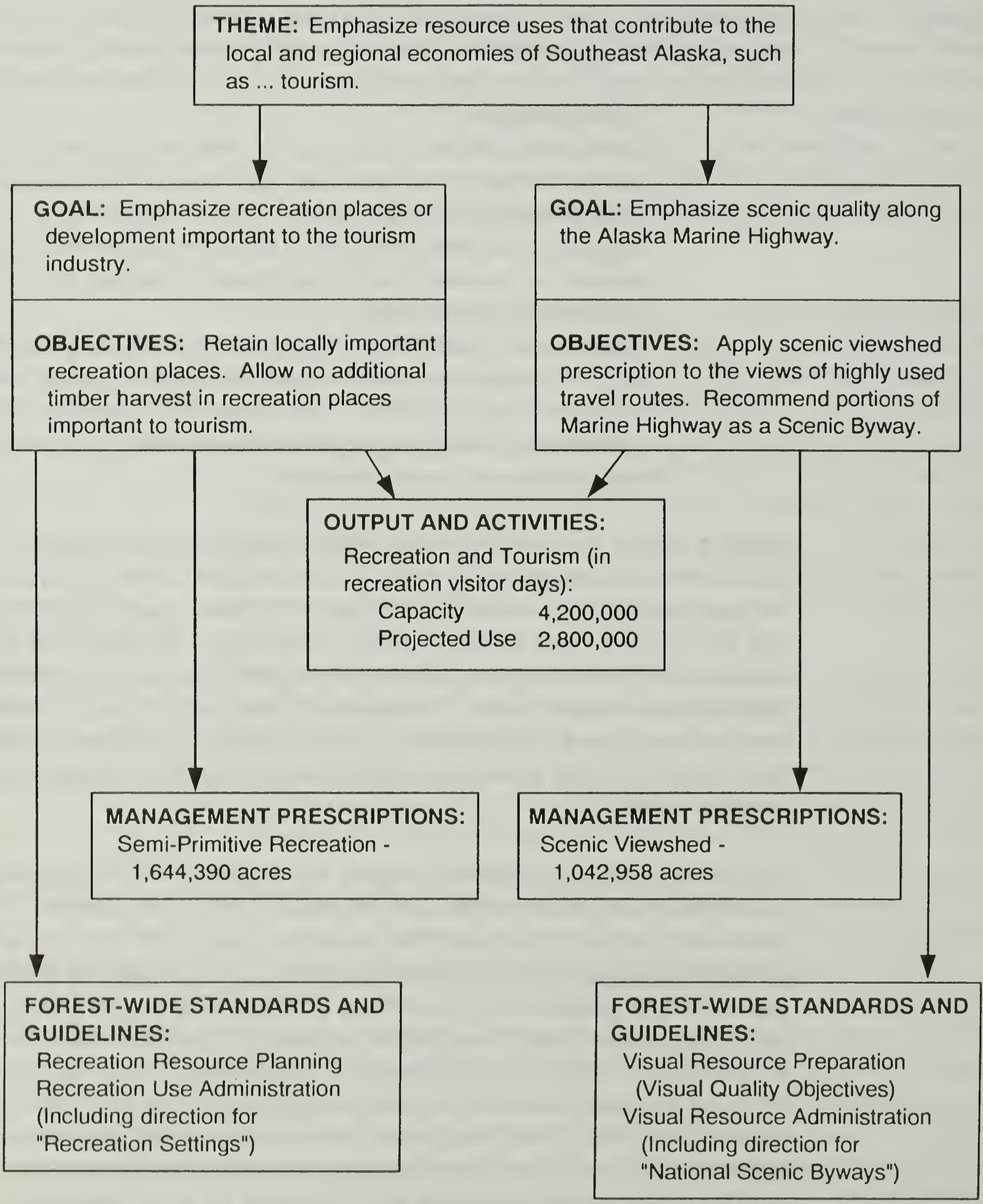
a. *Theme* - The overall management intent and resource emphasis of the alternative.
b. *Goals and Objectives* - More specific statements of emphasis, by issue or resource. The objectives often specify which resource uses, prescriptions, or standards to use or emphasize.
c. *Outputs and Activities* - Amounts of resource uses or forest products that will be provided on an annual basis, or that will be necessary to implement the alternative.
d. *Management Prescriptions* - The specific allocations (in acres, and on the alternative map) of each management prescription.
e. *Standards and Guidelines* - The forest-wide standards and guidelines, including management requirements, for management and protection of forest resources.

Figure 2-1 gives an example of how these components work together. In Alternative B, one aspect of the *theme* is to emphasize tourism in support of the local economy. The schematic in Figure 2-1 shows, in abbreviated form, how this theme is used in setting *goals and objectives*, and then how the objectives are "translated" into amounts of recreation use and opportunities (*outputs and activities*), specific *management prescriptions* to apply, and the *forest-wide standards and guidelines* to use when doing individual projects. Remember that this is a simplified example and shows just one selected aspect of an alternative.

The theme, goals and objectives, outputs and activities, and management prescriptions are presented for each alternative later in this chapter. The forest-wide standards and guidelines, except as noted under the alternative descriptions, will be the same for each alternative. The complete set of proposed standards and guidelines are included as Appendix G to this document, and will not be repeated here. Many of the standards and guidelines are discussed in Chapter 3 in relation to environmental consequences, since they serve as the basic mitigation measures for individual projects carried out under the revised Forest Plan. (The management requirements are also discussed in Appendix B.) Please keep in mind that the Forest-wide standards and guidelines, plus the practices and standards and guidelines for each management prescription (Appendix F), represent a full set of mitigation measures for each alternative.

FIGURE 2-1

RELATIONSHIP OF THE DIFFERENT COMPONENTS OF A FOREST PLAN ALTERNATIVE[1]



[1] Selected portions of Alternative B related to tourism.

Management Prescriptions

While the allocation of the management prescriptions will vary by alternative (that is, where each prescription will be applied), the prescriptions themselves remain the same. Appendix F includes the full set of proposed management prescriptions.

Twenty-one different management prescriptions have been developed, in response both to the public issues, and to concerns identified during the analysis of the management situation. These prescriptions represent a wide range of allocation choices for managing specific areas of the Forest. They allow varying degrees of resource protection and development, from wilderness (no land-disturbing activities) to full commodity development (intensive clearcutting or mining). A brief description of each management prescription follows, and Table 2-3 compares the prescriptions in relation to issues and resources.

Wilderness - Manage for the preservation of areas essentially unaffected by human use that provide outstanding opportunities for solitude, primitive recreation, and scientific and educational uses. Roads are not permitted and use of mechanical transport and motorized equipment is limited.

Wilderness National Monument - Manage for the Wilderness portions of National Monuments that provide outstanding opportunities for solitude and primitive recreation and to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest. Roads are not permitted and use of mechanical transport and motorized equipment is limited.

Nonwilderness National Monument - Manage the nonwilderness portions of National Monuments to facilitate development of significant mineral resources to assure mining activities are compatible, to the maximum extent feasible, with the purposes for which the Monument was established.

Research Natural Area - Manage areas for research and education and/or to maintain natural diversity on National Forest System lands. No timber harvest will occur.

Beach Fringe and Estuary - Manage for natural beach fringe and estuary habitats, including windfirm old-growth conifer stands, cliffs, and beaches above the mean high-tide line. Timber harvesting is limited to salvage after catastrophic events. Roads associated with log transfer facilities may be located within the area.

Primitive Recreation - Provide recreation opportunities and experiences outside Wilderness in unmodified natural environments where interaction with other visitors is infrequent, and the opportunity for independence and closeness to nature is high. Timber harvesting is limited to insect and disease control. Roads are absent.

Enacted Municipal Watersheds - Manage enacted municipal watersheds to meet State Water Quality Standards for domestic use. No timber harvesting will be scheduled, but insect-infested and diseased timber may be removed under conditions which safeguard the quantity and quality of water. Roads are limited to administer the municipal watersheds.

Old-Growth Habitat - Maintain old-growth conifer habitat in its natural condition to benefit old-growth and associated fish and wildlife resources. No timber harvesting will be scheduled and roads will be located outside the area when possible.

Semi-primitive Recreation - Provide motorized and non-motorized recreation opportunities in natural and natural appearing environments where interaction with others is low and the opportunity for independence and self-reliance is moderate to high. When present, roads are few and used primarily to expand and improve access to recreation opportunities or to permit access to other parts of the Forest and other ownerships. Timber harvest is limited to salvage of catastrophic events or beach log recovery.

Experimental Forests - Manage to provide a variety of long-term opportunities for Forest research and demonstration areas essential to managing forest resources. Timber harvesting will occur only for these purposes. Roads will be developed to facilitate ongoing research.

Scenic Viewshed - Manage activities so they are not obvious when the landscape is viewed from land or marine travel routes, recreation sites, popular bays and anchorages or small plane recreation routes. Timber harvesting and roads are limited by the landscape's ability to visually absorb such activity.

Visual-Timber - Emphasize mantaining scenic quality. Timber harvesting and roads are permitted while meeting visual quality objectives of the area.

Roaded Natural/Rural Recreation - Provide recreation opportunities associated with motorized and non-motorized activities generally accessible by conventional motor vehicles on roads or by boat. Timber harvesting is allowed with priority to maintain existing and proposed recreation sites. Roads are permitted.

Timber Production - Manage the area to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the timber resource and for maximum long-term timber production. Roads are permitted.

Minerals - Encourage the exploration and development of mineral resources in areas having high potential for mineral commodities including nationally-designated strategic and critical minerals. Until mineral activities are initiated,

the area will be managed according to the management area prescription shown on the maps in the map packet.

Fish Habitat and Water Quality Requirements - Meet riparian management requirements of no serious and adverse effects to fish habitat and water quality. Timber harvesting will be allowed where not in conflict with protecting riparian-associated resources. Roads will be located outside the area to the extent practicable.

Stream and Lake Protection - Maintain or enhance fish and other riparian-associated resources. Timber harvesting is allowed where not in conflict with protecting riparian-associated resources. Roads will be located outside the area to the extent practicable.

Special Areas - Provide for the inventory, maintenance, interpretation, and protection of areas with archeological, historical, Native American religious, scenic, geological, botanical, zoological, palentological or other special features. No timber harvest is scheduled. Roads will not be permitted unless compatible with management objectives.

Wild Rivers - Maintain and enhance the outstandingly remarkable values within the river corridor of river segments which qualify the river to be classified a *Wild River*. Shorelines are primitive and undeveloped. Timber harvesting is limited to insect and disease control. Roads generally are not present. Access is by trail, airplane or boat.

Scenic Rivers - Maintain and enhance the outstandingly remarkable values within the river corridor of river segments which qualify the river to be classified a *Scenic River*. Shorelines are largely undeveloped but may be accessible in places by roads. Timber harvesting is limited by the ability of the landscape to visually absorb the activity. Roads will be designed to be compatible with the landscape.

Recreation Rivers - Maintain and enhance the outstandingly remarkable values within the river corridor of river segments which qualify the river to be classified a *Recreation River*. Shoreline development may occur and the river may be readily accessible by road. Timber harvesting is allowed with priority to maintain existing and proposed recreation sites within the corridor. Roads are permitted.

Note: The Fish Habitat and Water Quality Requirements prescription was not selected for any alternative. The more restrictive Stream and Lake Protection prescription was favored for protection of the high-value fish resource.

TABLE 2-3 SUMMARY COMPARISON OF MANAGEMENT AREA PRESCRIPTIONS

Code	Management Area Prescrip-tion	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Enhancement	Timber Management	Roads	Wildlife Habitats	Minerals Location & Leasing	Riparian
WW	Wilderness	Preservation, Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	Compatible with Wilderness Objectives	Not Suitable, Beach Log Salvage	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Enhanced
WM	Wilderness National Monument	Preservation, Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	Compatible with Wilderness Monument Objectives	Not Suitable, Beach Log Salvage	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Enhanced
NM	Nonwilderness National Monument	Retention, Partial Retention, Modification, Maximum Modification	Primitive, Semi-primitive Motorized and Non-motorized, Roaded Natural, Roaded Modified	Open for Traditional Access	Compatible with Nonwilderness Monument Objectives	Not Suitable, Beach Log Salvage	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Generally Maintained or Enhanced
RA	Research Natural Area	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open, Restricted	Allowed if Compatible with RNA Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Enhanced
BF	Beach Fringe and Estuary	Retention, Partial Retention	Semi-primitive Motorized and Non-motorized	Open	Allowed	Not Suitable, Second-Growth Management if Previously Harvested	Case by Case Basis	Natural Distribution and Abundance of Beach Fringe and Estuary Habitats	Open	Maintained or Enhanced
PR	Primitive Recreation	Retention	Primitive	Open for Traditional Access	Compatible with Recreation Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Open	Maintained or Enhanced
MW	Enacted Municipal Watersheds	All	All	Open, Restricted	Generally Inconsistent	Not Suitable	Administrative Access on Case by Case Basis	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Enhanced

TABLE 2-3 SUMMARY COMPARISON OF MANAGEMENT AREA PRESCRIPTIONS (continued)

Code	Management Area Prescription	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Enhancement	Timber Management	Roads	Wildlife Habitats	Minerals Location & Leasing	Riparian
OG	Old-Growth Habitat	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	Allowed	Not Suitable	Case by Case Basis	Old-growth Habitat Maintained	Open	Maintained or Enhanced
SP	Semi-primitive Recreation	Retention, Partial Retention	Semi-primitive Motorized	Open	Compatible with Recreation Objectives	Not Suitable	Limited Transportation Network	Old-growth Habitat Maintained	Open	Maintained or Enhanced
EF	Experimental Forests	All	All	Open, Restricted	Allowed	Not Suitable, Range of Harvesting Varies with Research Needs	Full Transportation Network	Habitats Vary Depending Upon Research Activities	Open	Generally Maintain or Enhance
SV	Scenic Viewshed	Retention, Partial Retention	All	Open	Compatible with Visual Objectives	Selection, Moderate Even-aged Harvesting	Limited Transportation Network	All Ages of Habitats with Slow Reduction in Amount of Old Growth	Open	Located in Prescription WQ or SL
VT	Visual-Timber	Partial Retention	Roaded Natural and Modified	Open	Allowed	Moderate Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Slow Reduction in Amount of Old Growth	Open	Located in Prescription WQ or SL
RN	Roaded Natural/Rural Recreation	Partial Retention	Roaded Natural	Open	Encouraged	Selection, Limited Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Moderate Reduction in Amount of Old Growth	Open	Located in Prescription WQ or SL
TM	Timber Production	Maximum Modification	Roaded Natural and Modified	Open	Allowed	Intensive Even-aged Harvesting	Full Transportation Network	Early, Middle and Mature Habitats	Open	Located in Prescription WQ or SL
MM	Minerals	Maximum Modification	All	Open, Restricted	Allowed	Complete Range of Harvesting	Case by Case Basis	Habitats Vary Depending Upon Mining Development	Emphasized	Minimize Disturbance

TABLE 2-3 SUMMARY COMPARISON OF MANAGEMENT AREA PRESCRIPTIONS (continued)

Code	Management Area Prescrip-tion	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Enhancement	Timber Management	Roads	Wildlife Habitats	Minerals Location & Leasing	Riparian
WQ	Fish Habitat and Water Quality Requirements	All	Semi-primitive Motorized, Rural, Roaded Natural	Open	Encouraged	No Harvest, Selection, Moderate to Intensive Evenaged Harvesting	Special Consideration	All Ages of Habitat with Some Old Growth Maintained	Open	No Serious and Adverse Effects to Water or Fish Habitat
SL	Stream and Lake Protection	All	Semi-primitive Motorized, Rural, Roaded Natural	Open	Encouraged	No Harvest, Selection, Moderate Even-aged Harvesting	Special Consideration	All Ages of Habitat with Majority of Old Growth Maintained	Open	Maintained or Enhanced
SA	Special Areas	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open	Allowed if Compatible with Special Areas Objectives	Not Suitable	Case by Case Basis	Natural Distribution and Abundance of Habitats	Open, with Restrictions	Maintained or Enhanced
WR	Wild Rivers	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	Compatible with Wild River Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitats	Withdrawn, Subject to Valid Existing Rights	Maintained or Enhanced
SR	Scenic Rivers	Retention, Partial Retention	Semi-primitive Motorized and Non-motorized	Open	Compatible with Scenic River Objectives	Selection, Limited Even-aged Harvesting	Limited Transportation Network	All Ages of Habitat with Minor Reduction in Amount of Old Growth	Open	Located in Prescription WQ or SL
RR	Recreation Rivers	Retention, Partial Retention, Modification	All	Open	Compatible with Recreation River Objectives	Selection, Moderate Even-aged Harvesting	Full Trans-portation Network	All Ages of Habitat with Moderate Reduction in Amount of Old Growth	Open	Located in Prescription WQ or SL

Comparison to the Current Tongass Plan

The Tongass Land Management Plan used four land allocation categories, called land use designations (LUD's), to specify how areas of the Tongass National Forest were to be managed. Each land use designation has a common purpose and management implications describing how the land should be used. A brief definition of the four LUD's follows (see further definitions in the glossary):

LUD I	Wilderness Areas managed as directed by the 1964 Wilderness Act, as amended by ANILCA.
LUD II	Roadless lands to be managed to retain their wildland character.
LUD III	Land to provide a combination of commodity and amenity values.
LUD IV	Land to be intensively managed for commodity or market resources.

For the purpose of inventorying resources and interpreting resource values, the Forest was divided into areas called value comparison units (VCU's). A VCU is generally a distinct geographic area that encompasses a drainage basin containing one or more large stream systems, with boundaries usually following watershed divides. Value comparison units average approximately 18,000 acres; there were originally 867 for the Forest.

The main purpose of the current Tongass Plan was to establish management direction for the Forest through the allocation of each VCU to one of the four LUD's, and to make other planning process determinations. The VCUs were also grouped into 141 management areas, each with area-specific management direction and a schedule of management activities. Thus each value comparison unit had a particular management emphasis defined by the land use designation and the management area direction. The revision will not use VCU's for assigning land allocations, but they remain a useful unit for describing some environmental consequences, and have been retained for that purpose.

Land allocations proposed for this revision are similar, but instead of summarizing these by VCU's that are allocated into one of the four LUD categories, the revised Forest Plan will specify the management area prescription location. The management area prescription location will vary by alternative, but each acre on the Tongass National Forest will always be covered by one of the 21 management prescriptions described in this document.

The development of more specific management direction beyond the broad land use designations was left to subsequent plan implementation decisions in the current Tongass Plan. Management prescriptions for specific areas were developed as part of project or area plans (such as the five-year operating plans for the two long-term timber sale contract areas); these, plus Regional

direction in the form of manual supplements and the Regional Guide, provided standards and guidelines for resource protection.

The primary change in the proposed revision is that the land allocations are now more specific, being defined as prescriptions (which are sets of compatible practices and standards and guidelines) rather than broad allocation categories, and that the coordinated forest-wide standards and guidelines will be included directly in the revised Plan. The revision will also eliminate the use of the 141 management areas and their associated activity schedules.

To help understand the transition from the current Tongass Plan's land use designations to the proposed management prescriptions, a comparison of the two is given in Table 2-4. The map packet also includes a map of the current land allocations, which can be compared to the prescription map for Alternative C (the current management alternative). To facilitate comparisons with other alternatives and their environmental consequences, the prescriptions, rather than the LUD's, will be used from now on for the "current plan" alternative (Alternative C; see map packet), as they are for the other alternatives.

Please note that the comparison given in Table 2-4 represents only an approximate correlation. In some cases, one of the 21 prescriptions could apply to more than one land use designation. This was inevitable when going from four broad categories to 21 more specific ones. In assigning the prescriptions to Alternative C, the intent of the original Tongass Plan has been followed. The assignment of the Old-Growth Habitat, Beach Fringe and Estuary, Scenic Viewshed and Visual-Timber prescriptions to LUD IV is intended to approximate areas that are managed under the current Tongass Plan as "wildlife retention," and as "extended rotation" for visually sensitive areas.

TABLE 2-4
LAND USE DESIGNATIONS AND MANAGEMENT PRESCRIPTIONS

1979 Tongass Plan Land Use Designation	Proposed Revision Management Prescription
LUD I	Wilderness National Monument Wilderness National Monument Nonwilderness Research Natural Areas Primitive Recreation Minerals (on valid exisitng claims) Wild Rivers Scenic Rivers
LUD II	Research Natural Areas Primitive Recreation Old-Growth Habitat Beach Fringe and Estuary Enacted Municipal Watersheds Minerals Special Areas Wild Rivers Scenic Rivers Recreation Rivers
LUD III	Old-Growth Habitat Beach Fringe and Estuary Experimental Forest Scenic Viewshed Semi-Primitive Recreation Roaded Natural/Rural Recreation Visual-Timber Timber Production Minerals Fish Habitat and Water Quality Stream and Lake Protection Scenic Rivers Recreation Rivers
LUD IV	Old-Growth Habitat Beach Fringe and Estuary Experimental Forest Roaded Natural/Rural Recreation Scenic Viewshed Visual-Timber Timber Production Minerals Fish Habitat and Water Quality Stream and Lake Protection

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

The use of the benchmarks in estimating resource potentials and formulating alternatives has been discussed. Although the benchmarks provided much useful information, and helped define the limits of the alternatives, they are not in themselves full alternatives, and are not considered in detail.

Departure

Timber supply projections for lands in non-National Forest ownership show significant declines early in the first decade of Forest Plan implementation (the 1990's). For at least one alternative to be able to make up for this projected shortfall, by increasing timber supply on National Forest land, a "departure" alternative was originally considered. Departure means allowing the first-decade allowable sale quantity to be higher than that of following decades (see the discussion of "non-declining even flow" in Appendix B). However, since Alternative D was able to respond to projected timber demands, a departure was not required and was not considered further.

Declassifying Designated Wilderness

The possibility of declassifying portions of Wilderness areas to make additional timber available for harvest was also considered. This would have been done for
the same reason as the departure described above. Since Alternative D was able to respond to projected timber demand, declassifying portions of Wilderness was not considered further.

ALTERNATIVES CONSIDERED IN DETAIL

This section presents the specifics of the seven alternatives being considered in detail. Included are an alternative representing "no action" (the current plan, alternative C), and six other alternatives (A-G) developed to respond differently to the issues and provide a range of choice for the decisionmaker and the public. There are also variations of Alternative E, F, and G, labeled E1, F1, and G1 respectively. The preferred alternative is identified in a separate letter included with this document and the summary.

Since this is a revision of an existing Forest Plan, the starting point is that plan. The no action alternative (Alternative C; see map packet), or current plan, means that all current planning direction would be continued unchanged. Current planning direction includes the 1979 Tongass Plan as amended, plus the other planning direction, project-type prescriptions, and standards and guidelines developed under the goals of that plan, or resulting from Forest Service policy decisions. The management prescriptions and forest-wide standards and guidelines in this proposed revision have incorporated much of this "other planning direction."

Applying the prescriptions and standards and guidelines to the "no action" alternative is reflective of the direction under which the Forest is currently being managed. The revision has offered an opportunity to assemble and refine this

management direction in one place, and in a coordinated fashion, and to further analyze the resource choices that result. The main **differences** in alternatives are found in the way the management prescriptions are assigned, and the resulting changes in the amounts of forest products, uses and activities that will be provided.

Continuing with the four land use designations (LUD's) described earlier would have been truly "no change" from current management (see "No Change" Alternative map in the map packet). Assigning the management prescriptions to alternative C to reflect, as closely as possible, the intent of the 1979 Tongass Plan and correspond, as closely as possible, to the LUD's, makes alternative C comparable with the other alternatives and yet retains its character as the "no action" alternative. (The map packet includes a map, labeled "no change alternative," which displays the four land use designations, as well as a map for alternative C with the 21 management prescriptions.)

Each alternative is presented in the same format, as discussed earlier. Included are the alternative theme, goals and objectives, a table of outputs and activities, and a table indicating the acres allocated to each prescription. Appendix F contains the detailed descriptions of the management prescriptions (with their associated practices and standards and guidelines), and Appendix G contains the Forest-wide standards and guidelines. These apply to all alternatives, and represent the full set of mitigation measures that are an integral part of each alternative.

The Forest Service follows a policy of "non-declining even flow" for timber harvest to ensure that a long-term sustained yield of timber will be available. This means that the amount of timber harvested in any one decade can not exceeed that of any succeeding decade. Non-declining even flow is determined in *cubic feet* of timber volume, which is the measure used for long-term modelling purposes. The timber outputs for each alternative are shown in *board feet*, which is currently the more common measure.

The ratio of board feet to cubic feet changes from decade to decade, depending on the timber volume harvested per acre, and because timber yield tables based on board feet and cubic feet are constructed independently (cubic feet being a better overall measure of usable wood). Therefore, the amount of board feet can vary, even decline, by decade while timber harvest measured in cubic feet remains constant. (Table 2-21 at the end of the chapter displays timber harvest in both board and cubic feet.)

A map 6f each alternative is included in the map packet. Each map shows the areas to which the individual management prescriptions have been assigned. The prescriptions are included in Appendix F. The forest-wide standards and guidelines, which are the same for each alternative, are included as Appendix

G, and a monitoring plan, also the same for each alternative, is included as Appendix H. These three Appendixes will form the major components of the "Revised Plan."

The alternatives were designed with the public issues as the framework, and the goals and objectives are categorized by the issues (with a category added for research). Forest resources that are not covered by the public issues have not been omitted: direction for these is included in the forest-wide standards and guidelines, and the management prescriptions. Most of these resources are also discussed in Chapter 3. Included in this category are air quality, cultural and historical resources, facilities, fire, insects and disease, lands, soils, special areas, water and existing wilderness.

Congressional legislation that would affect the Tongass National Forest is pending. The House of Representatives passed a bill in 1989 (H.R. 987), and another bill, which includes recommendations by the Southeast Conference, is being considered by the Senate. Aspects of these bills and proposals have been incorporated into several of the alternatives, as indicated in the alternative goals and objectives, and are discussed in Chapter 3. H.R. 987 includes 23 areas in the Tongass to be designated as Wilderness. These are included in Alternatives A and E. The Southeast Conference proposals (there are two versions) recommend certain "protected" areas, where timber harvest would not be allowed. These two versions are addressed in Alternatives B, F and G. The specific areas are listed and discussed in the "Roadless Area" section of Chapter 3.

ALTERNATIVE A

THEME

The theme of this alternative is to emphasize high-quality fish and wildlife habitat, wilderness and unroaded areas, wild and scenic rivers, scenic quality, subsistence use, and a wide range of recreation opportunities in a natural setting. It incorporates the 23 areas recommended for wilderness designation in House of Representatives Bill 987 (H.R. 987). Timber harvest and mining may occur at levels compatible with the other resources that are emphasized in this alternative.

GOALS AND OBJECTIVES

Scenic Quality

Goal: Provide scenic landscapes forest-wide, and emphasize scenic quality along the Alaska Marine Highway.

Objectives: Design activities to meet the inventoried visual quality objectives forest-wide. Apply the scenic viewshed prescription to the viewsheds of highly-used travel routes. Recommend the main line of the Alaska Marine Highway as a National Forest Scenic Byway.

Recreation

Goal: Provide a wide range of recreation opportunities in a natural setting, emphasizing existing recreation places.

Objectives: Retain the character and setting of existing recreation places, and existing recreation capacity. Allow no additional timber harvest in recreation places except where recreation use is dependent on timber roads. Maintain the maximum amount of Recreation Opportunity Spectrum "primitive" and "semi-primitive" classes available.

Fish Habitat

Goal: Maintain or enhance natural fish resources by managing some of the highest quality watersheds in ways which would not modify them significantly.

Objectives: In those watersheds where timber harvest and related activities will take place, apply "no-harvest" prescriptions (such as old-growth habitat), or the stream and lake protection prescription, to anadromous and resident fish streams. Manage all other streams following Best Management Practices to maintain water quality for downstream fish habitat.

Wildlife Habitat

Goal: Maintain a wide distribution of unroaded, unaccessed and unmodified old-growth habitats for species associated with old growth.

Objectives: Apply the old-growth habitat prescription to areas with high habitat integrity (as identified by the Alaska Department of Fish and Game). Apply the beach fringe prescription to all beach fringe and estuary habitat. In those areas

where major modifications will occur, design projects and activities to have the least adverse effects possible to wildlife habitat while still achieving the goals of the project.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Provide a level of timber supply (allowable sale quantity) in keeping with the other goals of this alternative.

Objective: Allow timber harvest in areas where other resource values are not the primary emphasis. Design activities to meet the inventoried visual quality objectives, and disperse harvest units to achieve wildlife objectives. Provide an average annual sale quantity of 181 million board feet the first decade.

Road System

Goal: Develop roads as required for resource projects and activities.

Objectives: Construct roads for projects as needed and where supported by project economics. Manage roaded access to provide quality subsistence opportunities and maintain existing roaded recreation uses. Close or restrict access as needed to maintain wildlife habitat.

Minerals

Goal: Emphasize the development of mineral resources in areas where amenity values are not the primary emphasis and that are not located in or around communities.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities, and to areas not sensitive to mineral activities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Add additional areas to the 5.4 million acres managed as Wilderness on the Tongass.

Objective: Recommend 23 areas totaling approximately 1.8 million acres of roadless areas (as recommended in H.R. 987) as additions to the National Wilderness Preservation System. (These areas are listed in Chapter 3 under Roadless Areas.)

Wild and Scenic Rivers

Goal: Recommend all tentatively eligible rivers be designated as components of the National Wild and Scenic Rivers System at their highest potential classification.

Objective: Recommend for designation 90 Wild River segments, 12 Scenic River segments, and 17 Recreation River segments for a total of 1504 miles (see Table 3-148).

Local Economy

Goal: Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. Emphasize commercial fishing and tourism.

Objectives: Emphasize employment related to tourism and the fishing industry. Provide timber harvest to support local employment where compatible with the other goals of this alternative.

Research

Goal: Provide research opportunities in keeping with the other goals of this alternative, with emphasis on high quality, representative research natural areas.

Objectives: Recommend for classification 30 Research Natural Areas (see Table 3-61) and portions of Shaheen Creek and Staney Creek as Experimental Forests. Manage these and the existing areas according to the appropriate management prescription.

TABLE A-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE A

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,271	4,271
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	188
Timber Harvest:			
Allowable Sale Quantity	million board feet	181	143
Reforestation	acres	6,000	5,100
Road Construction	miles	80	15

MRVD = thousand recreation visitor days

TABLE A-2
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVE A

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]/
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]/	1,818,213	
Designated [2]/	2,373,509	
WM-Wilderness National Monument [3]/	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2]/[3]/	67,684	
PR-Primitive Recreation	3,619,211	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	994,043	
SP-Semi-primitive Recreation	999,164	
MODERATE DEVELOPMENT		
EF-Experimental Forest	48,836	
SV-Scenic Viewshed	898,706	143,217
VT-Visual-Timber	1,266,856	168,285
RN-Roaded Natural/Rural Recreation	77,118	14,544
INTENSIVE DEVELOPMENT		
TM-Timber Production	1,097,337	209,875
MM-Minerals [4]/	15,287	
BF-Beach Fringe and Estuary	383,147	
SL-Stream and Lake Protection	82,478	
SA-Special Areas	6,231	
WR-Wild Rivers [5]/	90/1,206	
SR-Scenic Rivers [5]/	12/137	
RR-Recreation Rivers [5]/	17/161	

[1]/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
[2]/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
[3]/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
[4]/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
[5]/ Number of river segments/miles of river
[6]/ Only four of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE B

THEME

The theme of this alternative is to emphasize resource uses that contribute to the local and regional economies of Southeast Alaska, such as timber harvesting, commercial fishing, mining and tourism. Non-market values (such as wildlife habitat or visual quality), roadless area opportunities, and wild and scenic rivers will be emphasized in selected areas. Opportunities for local residents to pursue traditional lifestyles, including subsistence use and recreation, will also be emphasized. This alternative incorporates the 12 "protected areas" recommended by the Southeast Conference proposal of March, 1989.

GOALS AND OBJECTIVES

Scenic Quality

Goal: Maintain the existing visual condition of areas not currently being managed for intensive timber production (LUD IV), and emphasize scenic quality along the route of the Alaska Marine Highway.

Objectives: Manage for the inventoried visual quality objectives in current-plan Land Use Designations I, II and III. Apply the scenic viewshed prescription to the viewsheds of highly-used travel routes. Recommend the main line of the Alaska Marine Highway as a National Forest Scenic Byway.

Recreation

Goal: Provide a range of recreation opportunities with emphasis on recreation places popular with local users, and recreation places or developments important to the tourism industry.

Objectives: Retain locally-important recreation places, and existing recreation capacity. Allow no additional timber harvest in recreation places important to tourism, except where recreation use is dependent on timber roads. Assign semi-primitive and primitive recreation prescriptions to the 12 "protected areas" suggested by the Southeast Conference.

Fish Habitat

Goal: Maintain or enhance fish habitat productivity.

Objectives: In those watersheds where major management activities will take place, apply a "no-timber harvest" prescription (such as old-growth habitat), or the stream and lake protection prescription, to anadromous and resident fish streams. Manage all other streams following Best Management Practices to maintain water quality for downstream fish habitat.

Wildlife Habitat

Goal: Maintain a wide distribution of old-growth habitats for old-growth associated species.

Objectives: Apply the old-growth habitat prescription to areas with high habitat integrity (as identified by the Alaska Department of Fish and Game), while maintaining the timber harvest and minerals objectives. Apply the beach fringe prescription to estuaries and areas containing bald eagle nests. Provide for old-growth associated wildlife habitat in important subsistence use areas, and the areas identified by the Southeast Conference for non-timber management.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Provide a level of timber supply (allowable sale quantity) that will contribute to maintaining local timber employment and a regional timber industry.

Objective: Provide an average annual allowable sale quantity of 354 million board feet in the first decade in a manner that is responsive to local demands and market conditions. Continue capital investment funding as appropriate to provide economic timber offerings.

Road System

Goal: Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities, maintain existing roaded recreation uses, and for habitat improvement projects. Recognize the potential for future transportation interties.

Minerals

Goal: Emphasize the development of mineral resources in areas with high development potential.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential that will contribute to local employment and a regional mining industry. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Manage large, regionally-recognized areas to retain their roadless character, in addition to the 5.4 million acres managed as Wilderness on the Tongass.

Objective: Assign "no timber harvest" prescriptions (primitive recreation, old-growth habitat, or semi-primitive recreation) reflective of the needs and uses of particular areas, to the 12 "protected areas" identified by the Southeast Conference. (See Table 3-67.)

Wild and Scenic Rivers

Goal: Recommend that representative tentatively eligible rivers be designated as components of the National Wild and Scenic Rivers System, where compatible with the other goals of this alternative.

Objective: Recommend for designation 45 Wild River segments, 12 Scenic River segments, and 14 Recreation River segments for a total of 926 miles representing the area's seven geographic provinces, including those within the 12 "protected areas" recommended by the Southeast Conference, where compatible with the goals of that area (see Table 3-148).

Local Economy

Goal: Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. These include timber harvesting, commercial fishing, mining and tourism.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, including timber harvesting, fishing, recreation and tourism, and mining.

Research

Goal: Provide research opportunities in keeping with the other goals of this alternative, with emphasis on representative natural areas.

Objectives: Recommend for classification 27 Research Natural Areas (see Table 3-61) and the Shaheen Creek and Staney Creek proposed Experimental Forests listed for this alternative in Chapter 3 under Research Natural Areas and Experimental Forests. Manage these and the existing areas according to the appropriate management prescription.

TABLE B-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE B

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,249	4,249
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	177
Timber Harvest:			
Allowable Sale Quantity	million board feet	354	315
Reforestation	acres	12,200	12,200
Road Construction	miles	223	41

MRVD = thousand recreation visitor days

TABLE B-2
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVE B

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]/
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]/	0	
Designated [2]/	2,373,509	
WM-Wilderness National Monument [3]/	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2]/[3]/	104,338	
PR-Primitive Recreation	4,554,701	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	337,735	
SP-Semi-primitive Recreation	1,688,159	
MODERATE DEVELOPMENT		
EF-Experimental Forest	71,770	
SV-Scenic Viewshed	1,042,958	313,432
VT-Visual-Timber	574,847	108,258
RN-Roaded Natural/Rural Recreation	85,600	30,163
INTENSIVE DEVELOPMENT		
TM-Timber Production	2,262,260	637,071
MM-Minerals [4]/	138,833	
BF-Beach Fringe and Estuary	565,485	
SL-Stream and Lake Protection	94,940	11,597
SA-Special Areas	6,231	
WR-Wild Rivers [5]/	45/632	
SR-Scenic Rivers [5]/	12/150	
RR-Recreation Rivers [5]/	14/144	

[1]/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.

[2]/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.

[3]/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.

[4]/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.

[5]/ Number of river segments/miles of river

[6]/ Only five of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE C

THEME

The theme of this alternative is to continue the land allocations, resource outputs and activities, and management direction of the current Tongass Land Management Plan (as approved in 1979 and amended in 1986). Timber harvest levels that contribute to maintaining local employment are emphasized, along with maintaining the variety of recreation opportunities and scenic quality currently available. Opportunities for local residents to pursue traditional lifestyles, including subsistence use and recreation, will continue.

GOALS AND OBJECTIVES

Note: The following goal statements are taken from the 1986 Tongass Plan amendment. Goals for subsistence, wild and scenic rivers, local economy (apart from the economic emphasis of the timber goal) and research were not included in the Tongass Plan, and have been added here. Objectives were not given, although the goal statements are often more inclusive than have been used for the other alternatives. Reference to the land use designations (LUD's) has been made for several of the objectives.

Scenic Quality

Goals: Maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, and in keeping with the land use designation, projects will be designed to be compatible with the natural elements of the visual resource.

Objective: Management activities will be designed to meet the inventoried Visual Quality Objectives in LUD's I, II and III. In LUD IV areas, timber harvest activities may dominate the seen area, but may be modified in visually sensitive areas where timber objectives can be met.

Recreation

Goals: Provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets. Recreation facilities and attractions near communities will be improved for the use of visitors to Southeast Alaska, by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

Objectives: Maintain all existing recreation places in LUD's I and II, and specified ones in LUD III. Manage LUD II areas not designated otherwise for primitive or semi-primitive recreation.

Fish Habitat

Goals: Maintain and enhance the natural fisheries resource by managing some of the highest quality watersheds in ways which would not modify them significantly. In those areas where major management activities would take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible.

Objective: Assign the stream and lake protection prescription to streams in LUD's II, III and IV in areas where timber harvest could be considered.

Wildlife Habitat

Goals: Maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In those areas where major modifications will occur, those changes will be designed to minimize adverse effects on wildlife.

Objective: Maintain old-growth habitat equivalent to the "retention factors method" used in the current plan. Apply the beach fringe and estuary prescription to estuaries and areas containing bald eagle nests.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Make enough timber available from National Forest lands to maintain current levels of timber-related employment within the context of the total timber available from other landownerships.

Objective: Provide an average annual allowable sale quantity of 450 million board feet the first decade.

Road System

Goal: Insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the various resources. Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities and maintain existing roaded recreation uses. Recognize the potential for future transportation interties.

Minerals

Goal: Facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities, and to areas not sensitive to mineral activities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Manage approximately 35 percent of the Forest as wilderness including several large, nationally recognized areas, as well as a number of smaller areas representing the different landscape character types of Southeast Alaska.

Objective: (Note: The above goal was realized with the 5.4 million acres of Wilderness designated under ANILCA.)

Wild and Scenic Rivers

Since current direction does not address Wild and Scenic Rivers, this alternative does not recommend any of the tentatively eligible rivers for designation as components of the Wild and Scenic Rivers system.

Local Economy

Goal: Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. Emphasize timber harvesting, commercial fishing, mining and tourism.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, including timber harvesting, fishing, recreation and tourism, and mining. (Also, see goal for timber harvest.)

Research

Goal: Continue research opportunities in keeping with the other goals of this alternative.

Objectives: Recommend for classification 20 Research Natural Areas (see Table 3-61). Manage these and the existing areas according to the research natural area prescription. Manage the existing Experimental Forests according to the experimental forest prescription.

TABLE C-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE C

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,240	4,240
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	171
Timber Harvest:			
Allowable Sale Quantity	million board feet	450	361
Reforestation	acres	15,400	12,900
Road Construction	miles	234	63

MRVD = thousand recreation visitor days

TABLE C-2
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVE C

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]	0	
Designated [2]	2,373,509	
WM-Wilderness National Monument [3]	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2/3]	64,010	
PR-Primitive Recreation	3,144,980	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	595,717	
SP-Semi-primitive Recreation	634,306	
MODERATE DEVELOPMENT		
EF-Experimental Forest	17,199	
SV-Scenic Viewshed	570,714	135,528
VT-Visual-Timber	1,006,843	166,059
RN-Roaded Natural/Rural Recreation	833,770	229,102
INTENSIVE DEVELOPMENT		
TM-Timber Production	3,998,688	1,219,033
MM-Minerals [4]	28,853	
BF-Beach Fringe and Estuary	187,849	
SL-Stream and Lake Protection	298,717	
SA-Special Areas	6,231	
WR-Wild Rivers [5]	0	
SR-Scenic Rivers [5]	0	
RR-Recreation Rivers [5]	0	

[1]/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.

[2]/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.

[3]/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.

[4]/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.

[5]/ Number of river segments/miles of river

[6]/ Only four of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE D

THEME

The theme of this alternative is to provide an economic timber supply from public lands to meet predicted demand, and existing mill capacity. Management of other resources will be done in an efficient manner consistent with the emphasis on timber supply, and while meeting environmental standards. Some areas with low timber volumes will be managed for recreation, visual quality and other non-commodity resources. Areas in and around communities will be managed to provide for recreation and related traditional uses, including subsistence.

GOALS AND OBJECTIVES

Scenic Quality

Goal: Manage for the inventoried Visual Quality Objectives in the most highly scenic landscapes where compatible with the timber supply goal.

Objective: Maintain inventoried Visual Quality Objectives within 15 miles of communities.

Recreation

Goal: Retain existing recreation places and capacities where compatible with the timber supply objective.

Objectives: Maintain developed sites and other recreation places within 15 miles of communities. Maintain community- and tourism-related recreation opportunities where compatible with the timber production goal.

Fish Habitat

Goal: Maintain or enhance natural fish resources.

Objectives: Assign the stream and lake protection prescription to anadromous and resident fish streams where timber harvest may occur. Manage other streams following Best Management Practices to protect water quality for downstream benefiting uses including fish habitat.

Wildlife Habitat

Goal: Where consistent with the timber supply objective, maintain a distribution of unmodified old-growth habitats for species associated with old growth.

Objectives: In areas where ground disturbing activities are proposed, maintain at least 24 percent of the productive old-growth wildlife habitat to ensure viable wildlife populations. Apply the beach fringe and estuary prescription to estuaries and areas containing bald eagle nests.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Maintain a timber supply sufficient to meet local and regional demands.

Objectives: Provide an average annual allowable sale quantity of 550 million board feet the first decade. Manage the most economically efficient suitable forest lands as needed to achieve the supply goal, while meeting at least the minimum contractual requirements for the two long-term sales within their sale boundaries.

Road System

Goal: Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities and to protect wildlife.

Minerals

Goal: Emphasize the development of mineral resources in areas with high development potential.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: In addition to the 5.4 million acres managed as Wilderness on the Tongass manage large, regionally-recognized areas to retain their roadless character where consistent with the timber production goal.

Objective: Assign "no-timber harvest" prescriptions (primitive recreation, old-growth habitat, or semi-primitive recreation) reflective of the needs and uses of particular areas, to unroaded areas not needed to contribute to the timber goal.

Wild and Scenic Rivers

Goal: Recommend that representative tentatively eligible rivers be designated as components of the National Wild and Scenic Rivers System, where compatible with the other goals of this alternative.

Objective: Recommend for designation representative rivers in Wilderness, in areas with "no-timber harvest" prescriptions, and in areas with low timber volumes, which provides 21 Wild River segments, 4 Scenic River segments, and 3 Recreation River segments totaling 424 miles (see Table 3-148).

Local Economy

Goals: Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska, including timber harvesting, commercial fishing, mining and tourism. For timber employment, consider the overall demand and supply situation in Southeast Alaska.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, but with timber-related employment the first priority.

Research

Goal: Continue research opportunities in keeping with the other goals of this alternative.

Objectives: Recommend for classification 14 Research Natural Areas (see Table 3-61). Manage these and the existing areas according to the research natural area prescription. Manage the existing Experimental Forests according to the experimental forest prescription.

TABLE D-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE D

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,219	4,219
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	168
Timber Harvest:			
Allowable Sale Quantity	million board feet	550	422
Reforestation	acres	18,500	15,200
Road Construction	miles	293	63

MRVD = thousand recreation visitor days

TABLE D-2
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVE D

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]/
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]/	0	
Designated [2]/	2,373,509	
WM-Wilderness National Monument [3]/	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2]/[3]/	27,710	
PR-Primitive Recreation	1,529,856	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	51,340	
SP-Semi-primitive Recreation	3,369,626	
MODERATE DEVELOPMENT		
EF-Experimental Forest	17,199	
SV-Scenic Viewshed	209,059	27,918
VT-Visual-Timber	161,651	8,984
RN-Roaded Natural/Rural Recreation	129,784	35,410
INTENSIVE DEVELOPMENT		
TM-Timber Production	5,363,379	1,381,683
MM-Minerals [4]/	33,570	
BF-Beach Fringe and Estuary	229,610	
SL-Stream and Lake Protection	263,579	
SA-Special Areas	6,231	
WR-Wild Rivers [5]/	21/365	
SR-Scenic Rivers [5]/	4/45	
RR-Recreation Rivers [5]/	3/14	

1/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
2/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
3/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
4/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
5/ Number of river segments/miles of river
6/ Only four of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE E

THEME

The theme of this alternative is to incorporate the 23 areas recommended for wilderness designation in House of Representatives Bill 987 (H.R. 987). All other areas would continue with the land allocations, resource outputs and activities, and management direction of the current Tongass Land Management Plan (as approved in 1979 and amended in 1986).

GOALS AND OBJECTIVES

Scenic Quality

Goals: Maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, and in keeping with the land use designation, projects will be designed to be compatible with the natural elements of the visual resource.

Objective: Management activities will be designed to meet the inventoried Visual Quality Objectives in LUD's I, II and III. In LUD IV areas, timber harvest activities may dominate the seen area, but may be modified in visually sensitive areas where timber objectives can be met.

Recreation

Goals: Provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets. Recreation facilities and attractions near communities will be improved for the use of visitors to Southeast Alaska, by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

Objectives: Maintain all existing recreation places in LUD's I and II, and specified ones in LUD III. Manage LUD II areas not designated otherwise for primitive or semi-primitive recreation.

Fish Habitat

Goals: Maintain and enhance the natural fisheries resource by managing some of the highest quality watersheds in ways which would not modify them significantly. In those areas where major management activities will take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible.

Objective: Assign the stream and lake protection prescription to streams in LUD's II, III, and IV streams in areas where timber harvest may occur.

Wildlife Habitat

Goals: Maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In those areas where major modifications will occur, those changes will be designed to minimize adverse effects on wildlife.

Objective: Maintain old-growth habitat equivalent to the "retention factors method" concept used in the current plan. Apply the beach fringe and estuary prescription to estuaries and areas containing bald eagle nests.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Make enough timber available from National Forest lands to maintain current levels of timber-related employment consistent with the loss of 637,635 acres of tentatively suitable forest lands designated as additions to the National Wilderness System and cancellation of the long-term contracts.

Objective: Provide an economically efficient timber supply from the remaining available forest lands. This objective would provide an average annual allowable sale quantity of 280 million board feet the first decade.

Road System

Goal: Insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the various resources. Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities and maintain existing roaded recreation uses. Recognize the potential for future transportation interties.

Minerals

Goal: Facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities, and to areas not sensitive to mineral activities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Add additional areas to the 5.4 million acres managed as Wilderness on the Tongass.

Objective: Recommend approximately 1.8 million acres of roadless areas (as recommended in H.R. 987) as additions to the National Wilderness Preservation System. (These areas are listed in Chapter 3 under Roadless Areas.)

Wild and Scenic Rivers

Since neither H.R. 987 nor the current Tongass Plan addresses Wild and Scenic Rivers, this alternative does not recommend any tentatively eligible rivers for designation as components of the Wild and Scenic Rivers system.

Local Economy

Goal: Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. Emphasize timber harvesting, commercial fishing, mining and tourism.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, including timber harvesting, fishing, recreation and tourism, and mining. (Also, see goal for timber harvest.)

Research

Goal: Continue research opportunities in keeping with the other goals of this alternative.

Objectives: Recommend for classification 20 Research Natural Areas (see Table 3-61). Manage these and the existing areas according to the research natural area prescription. Manage the existing Experimental Forests according to the experimental forest prescription.

TABLE E-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE E

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,281	4,281
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	182
Timber Harvest:			
Allowable Sale Quantity	million board feet	280	227
Reforestation	acres	9,200	7,700
Road Construction	miles	129	25

MRVD = thousand recreation visitor days

ALTERNATIVE E1

The theme and goals and objectives of this alternative exactly parallel those of Alternative E with one exception.

The objective for Timber Harvest of Alternative E1 is to provide an adequate timber supply to ensure the opportunity for the Sitka pulp mill to remain open. The objective is to provide an average annual allowable sale quantity of 378 million board feet the first decade. This amount approximates the original estimate of the effect of the 23 new Wilderness Areas on the current Plan.

TABLE E-2

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE E1

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,261	4,193
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	173
Timber Harvest:			
Allowable Sale Quantity	million board feet	378	318
Reforestation	acres	13,090	11,546
Road Construction	miles	200	42

MRVD = thousand recreation visitor days

TABLE E-3
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVES E AND E1

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]/
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]/	1,818,213	
Designated [2]/	2,373,509	
WM-Wilderness National Monument [3]/	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2]/[3]/	37,934	
PR-Primitive Recreation	2,904,548	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	441,002	
SP-Semi-primitive Recreation	432,909	
MODERATE DEVELOPMENT		
EF-Experimental Forest	17,199	
SV-Scenic Viewshed	479,775	50,374
VT-Visual-Timber	815,256	59,150
RN-Roaded Natural/Rural Recreation	631,139	77,526
INTENSIVE DEVELOPMENT		
TM-Timber Production	3,392,442	532,644
MM-Minerals [4]/	28,853	
BF-Beach Fringe and Estuary	138,019	
SL-Stream and Lake Protection	244,357	
SA-Special Areas	6,231	
WR-Wild Rivers [5]/	0	
SR-Scenic Rivers [5]/	0	
RR-Recreation Rivers [5]/	0	

[1]/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
[2]/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
[3]/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
[4]/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
[5]/ Number of river segments/miles of river
[6]/ Only four of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE F

THEME

The theme of this alternative is to manage for non-timber uses the 12 "protected areas" recommended by the Southeast Conference and endorsed by the Governor of the State of Alaska. All other areas would continue with the land allocations, resource outputs and activities, and management direction of the current Tongass Land Management Plan (as approved in 1979 and amended in 1986).

GOALS AND OBJECTIVES

Scenic Quality

Goals: Maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, and in keeping with the land use designation, projects will be designed to be compatible with the natural elements of the visual resource.

Objective: Management activities will be designed to meet the inventoried Visual Quality Objectives in LUD's I, II and III. In LUD IV areas, timber harvest activities may dominate the seen area, but may be modified in visually sensitive areas where timber objectives can be met.

Recreation

Goals: Provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets. Recreation facilities and attractions near communities will be improved for the use of visitors to Southeast Alaska, by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

Objectives: Maintain all existing recreation places in LUD's I and II, and specified ones in LUD III. Manage LUD II areas not designated otherwise for primitive or semi-primitive recreation.

Fish Habitat

Goals: Maintain and enhance the natural fisheries resource by managing some of the highest quality watersheds in ways which would not modify them significantly. In those areas where major management activities will take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible.

Objective: Assign the stream and lake protection prescription to streams in LUD's II, III, and IV streams in areas where timber harvest may occur.

Wildlife Habitat

Goals: Maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In those areas where major modifications will occur, those changes will be designed to minimize adverse effects on wildlife.

Objective: Maintain old-growth habitat equivalent to the "retention factors method" concept used in the current plan. Apply the beach fringe and estuary prescription to estuaries and areas containing bald eagle nests.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Make enough timber available from National Forest lands to maintain current levels of timber-related employment within the context of the total timber available from other land ownerships.

Objective: Provide an economically efficient timber supply from the remaining available forest lands. This objective would provide an average annual allowable sale quantity of 389 million board feet the first decade.

Road System

Goal: Insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the various resources. Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities and maintain existing roaded recreation uses. Recognize the potential for future transportation inter-ties.

Minerals

Goal: Facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities, and to areas not sensitive to mineral activities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Manage approximately 35 percent of the Forest as wilderness including several large, nationally-recognized areas, as well as a number of smaller areas representing the different landscape character types of Southeast Alaska. In addition, manage the 12 "Protected Areas" recommended by the Southeast Conference in "no-timber harvest" prescriptions.

Objective: Assign "no-timber harvest" prescriptions (old-growth habitat, primitive recreation, or semi-primitive recreation) to the 12 "Protected Areas" identified by the Southeast Conference, March 1989. (See Table 3-67.)

Wild and Scenic Rivers

Since the Southeast Conference proposal does not address Wild and Scenic Rivers, this alternative does not recommend any of the tentatively eligible rivers for designation as components of the Wild and Scenic Rivers system.

Local Economy

Goal: Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. Emphasize timber harvesting, commercial fishing, mining and tourism.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, including timber harvesting, fishing, recreation and tourism, and mining. (Also, see goal for timber harvest.)

Research

Goal: Continue research opportunities in keeping with the other goals of this alternative.

Objectives: Recommend for classification 20 Research Natural Areas (see Table 3-61). Manage these and the existing areas according to the research natural area prescription. Manage the existing Experimental Forests according to the experimental forest prescription.

TABLE F-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE F

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,231	4,231
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	172
Timber Harvest:			
Allowable Sale Quantity	million board feet	389	328
Reforestation	acres	13,400	11,900
Road Construction	miles	206	45

MRVD = thousand recreation visitor days

ALTERNATIVE F1

The theme and goals and objectives of this alternative exactly parallel those of Alternative F with one exception.

The objective for Timber Harvest of Alternative F1 is to provide an average annual allowable sale quantity of 420 million board feet the first decade. This amount approximates the original estimate, using 1979 Forest Plan data, of the effect of the "12 Protected Areas" (no harvest) on the current Plan.

TABLE F-2

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE F1

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,258	4,182
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	171
Timber Harvest:			
Allowable Sale Quantity	million board feet	420	339
Reforestation	acres	14,413	12,200
Road Construction	miles	220	48

MRVD = thousand recreation visitor days

TABLE F-3
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVES F AND F1

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]	0	
Designated [2]	2,373,509	
WM-Wilderness National Monument [3]	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2][3]	68,998	
PR-Primitive Recreation	3,800,288	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	544,421	
SP-Semi-primitive Recreation	597,490	
MODERATE DEVELOPMENT		
EF-Experimental Forest	17,199	
SV-Scenic Viewshed	527,412	77,453
VT-Visual-Timber	946,982	94,354
RN-Roaded Natural/Rural Recreation	722,741	245,426
INTENSIVE DEVELOPMENT		
TM-Timber Production	3,679,245	817,778
MM-Minerals [4]	28,613	
BF-Beach Fringe and Estuary	179,250	
SL-Stream and Lake Protection	268,767	
SA-Special Areas	6,231	
WR-Wild Rivers [5]	0	
SR-Scenic Rivers [5]	0	
RR-Recreation Rivers [5]	0	

1/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
2/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
3/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
4/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
5/ Number of river segments/miles of river
6/ Only four of the Management Prescriptions can be considered for timber harvest.

ALTERNATIVE G

THEME

The theme of this alternative is to manage for non-timber uses the 16 areas recommended in the revised Southeast Conference proposal (revised 2/2/1990). All other areas would continue with the land allocations, resource outputs and activities, and management direction of the current Tongass Land Management Plan (as approved in 1979 and amended in 1986).

GOALS AND OBJECTIVES

Scenic Quality

Goals: Maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, and in keeping with the land use designation, projects will be designed to be compatible with the natural elements of the visual resource.

Objective: Management activities will be designed to meet the inventoried Visual Quality Objectives in LUD's I, II and III. In LUD IV areas, timber harvest activities may dominate the seen area, but may be modified in visually sensitive areas where timber objectives can be met.

Recreation

Goals: Provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets. Recreation facilities and attractions near communities will be improved for the use of visitors to Southeast Alaska, by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

Objectives: Maintain all existing recreation places in LUD's I and II, and specified ones in LUD III. Manage LUD II areas not designated otherwise for primitive or semi-primitive recreation.

Fish Habitat

Goals: Maintain and enhance the natural fisheries resource by managing some of the highest quality watersheds in ways which would not modify them significantly. In those areas where major management activities will take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible.

Objective: Assign the stream and lake protection prescription to streams in LUD's II, III, and IV in areas where timber harvest may occur.

Wildlife Habitat

Goals: Maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In those areas where major modifications will occur, those changes will be designed to minimize adverse effects on wildlife.

Objective: Maintain old-growth habitat equivalent to the "retention factors method" concept used in the current plan. Apply the beach fringe prescription to estuaries and areas containing bald eagle nests.

Subsistence

Goal: Provide for the continuation of subsistence uses by rural Alaska residents, including both Natives and non-Natives.

Objective: Apply the Forest-wide standards and guidelines for subsistence use to all projects. Evaluate potential impacts to subsistence users as required under ANILCA.

Timber Harvest

Goal: Make enough timber available from National Forest lands to maintain current levels of timber-related employment within the context of the total timber available from other land ownerships.

Objective: Provide an economically efficient timber supply from the remaining available forest lands. This objective would provide an average annual allowable sale quantity of 390 million board feet the first decade.

Road System

Goal: Insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the various resources. Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Objectives: Construct roads for access to suitable timber stands. Manage roaded access to provide quality subsistence opportunities and maintain existing roaded recreation uses. Recognize the potential for future transportation interties.

Minerals

Goal: Facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Objective: Apply the minerals prescription to emphasize mineral resource development in areas with high development potential, except in or around communities, and to areas not sensitive to mineral activities. Encourage the development of mineral resources in all prescriptions open to mineral entry within this alternative.

Wilderness and Roadless Areas

Goal: Manage approximately 35 percent of the Forest as wilderness including several large, nationally recognized areas, as well as a number of smaller areas representing the different landscape character types of southeast Alaska. In addition, manage the areas recommended in the revised Southeast Conference proposal in "no-timber harvest" prescriptions.

Objective: Assign "no-timber harvest" prescriptions (old-growth habitat, primitive recreation, or semi-primitive recreation) reflective of the needs and uses of particular areas, to the 16 areas identified by the revised Southeast Conference proposal, February 1990. (See Table 3-68.)

Wild and Scenic Rivers

Since the revised Southeast Conference proposal does not address Wild and Scenic Rivers, this alternative does not recommend any of the tentatively eligible rivers for designation as components of the Wild and Scenic Rivers system.

Local Economy

Goal: Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. Emphasize timber harvesting, commercial fishing, mining and tourism.

Objectives: Emphasize all facets of employment derived from the resources and uses of the National Forest, including timber harvesting, fishing, recreation and tourism, and mining. (Also, see goal for timber harvest.)

Research

Goal: Continue research opportunities in keeping with the other goals of this alternative.

Objectives: Recommend for classification 20 Research Natural Areas (see Table 3-61). Manage these and the existing areas according to the research natural area prescription. Manage the existing Experimental Forests according to the experimental forest prescription.

TABLE G-1

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE G

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,237	4,237
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	172
Timber Harvest:			
Allowable Sale Quantity	million board feet	390	330
Reforestation	acres	13,400	11,900
Road Construction	miles	207	45

MRVD = thousand recreation visitor days

ALTERNATIVE G1

The theme and goals and objectives of this alternative exactly parallel those of Alternative G with one exception.

The objective for Timber Harvest of Alternative G1 is to provide an average annual allowable sale quantity of 430 million board feet the first decade. This amount approximates the original estimate, using 1979 Forest Plan data, of the effect of the 16 areas of the revised Southeast Conference proposal on the current Plan.

TABLE G-2

AVERAGE ANNUAL OUTPUTS AND ACTIVITIES - ALTERNATIVE G1

Activity/Resource	*Unit of Measure*	*Decade 1 (1990-1999)*	*Decade 5 (2030-2039)*
Recreation and Tourism:			
Capacity	MRVD	4,251	4,186
Projected Use	MRVD	2,831	4,193
Fish and Wildlife:			
Commercial Fish Potential	million pounds	117	122
Sport Fishing	1,000 user days	222	298
Hunting	1,000 hunter days	103	171
Timber Harvest:			
Allowable Sale Quantity	million board feet	430	345
Reforestation	acres	14,722	12,443
Road Construction	miles	235	48

MRVD = thousand recreation visitor days

TABLE G-3
PRESCRIPTION ALLOCATIONS FOR ALTERNATIVES G AND G1

Management Prescription	Acres Allocated	Acres Suitable for Timber Harvest[6]/
RECOMMENDED AND EXISTING WILDERNESS/NATIONAL MONUMENTS		
WW-Wilderness		
Recommended [1]/	0	
Designated [2]/	2,373,509	
WM-Wilderness National Monument [3]/	3,096,446	
NM-Nonwilderness National Monument	163,033	
NATURAL SETTING		
RA-Research Natural Area [2]/[3]/	63,342	
PR-Primitive Recreation	3,758,332	
MW-Enacted Municipal Watersheds	9,733	
OG-Old Growth	528,750	
SP-Semi-primitive Recreation	555,325	
MODERATE DEVELOPMENT		
EF-Experimental Forest	17,199	
SV-Scenic Viewshed	516,996	73,238
VT-Visual-Timber	959,593	91,110
RN-Roaded Natural/Rural Recreation	703,476	113,081
INTENSIVE DEVELOPMENT		
TM-Timber Production	3,792,102	834,319
MM-Minerals [4]/	28,613	
BF-Beach Fringe and Estuary	178,345	
SL-Stream and Lake Protection	279,333	
SA-Special Areas	6,231	
WR-Wild Rivers [5]/	0	
SR-Scenic Rivers [5]/	0	
RR-Recreation Rivers [5]/	0	

[1]/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
[2]/ Within WW-Wilderness, there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
[3]/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
[4]/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
[5]/ Number of river segments/miles of river
[6]/ Only four of the Management Prescriptions can be considered for timber harvest.

COMPARISON OF ALTERNATIVES

This section presents comparisons of the seven alternatives considered in detail, including the three alternative variations where their outputs or effects differ from the other alternatives. The comparisons focus on the public issues, and are intended to highlight the major differences between the alternatives. Chapter 3 contains more detail on environmental consequences. The discussion here will include comparisons of management prescription allocations, resource outputs, economic factors, and selected effects.

Overall Comparisons

Table 2-5 displays the allocations of the management prescriptions for all seven alternatives. (Alternative variations E1, F1 and G1 have the same prescription allocations as Alternatives E, F and G, respectively.) Table 2-7 shows the same prescription allocations combined into four groups, based on similarities in the potential to create environmental effects. (The groups are explained in more detail in the introduction to Chapter 3.) These groups are also displayed in Figure 2-2. The following discussions will refer to these tables frequently. Table 2-6 displays some of the key outputs and effects discussed in this section in comparative form. At the end of the chapter, Table 2-24 presents a summary of some of the other outputs and effects discussed.

FIGURE 2-2

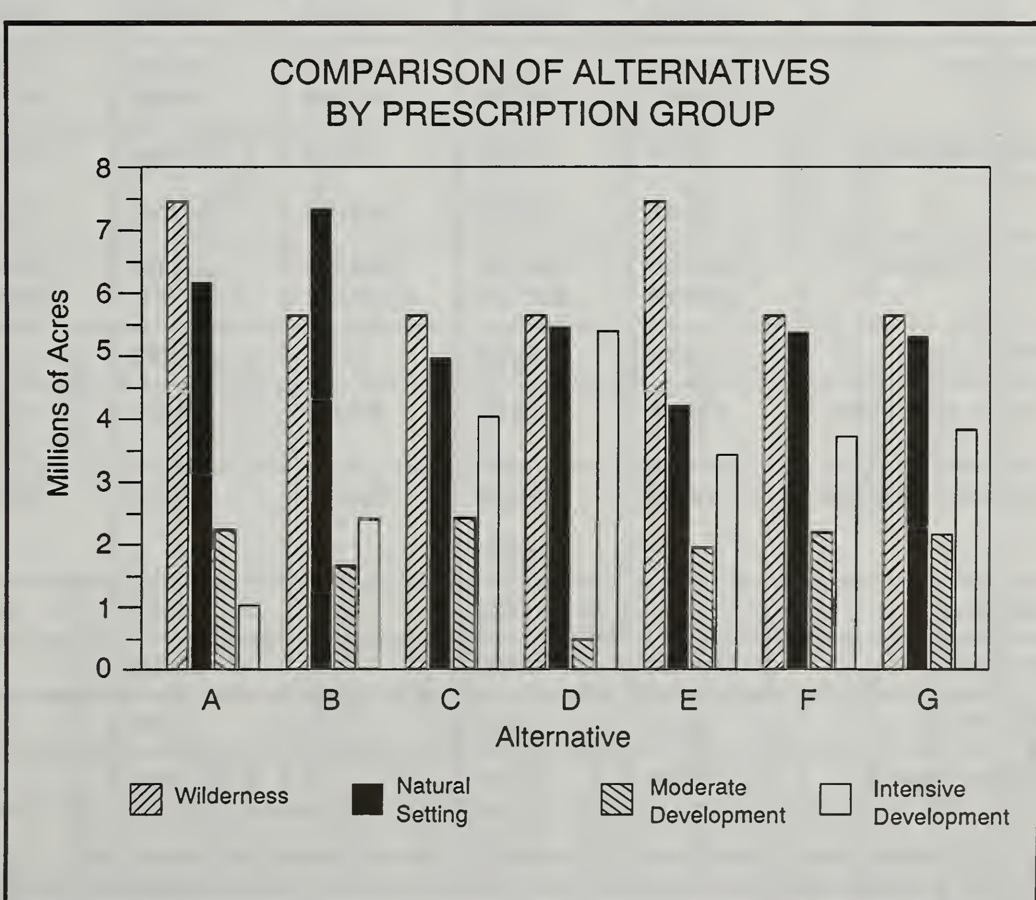


TABLE 2-5 MANAGEMENT AREA PRESCRIPTION ALLOCATIONS

Prescription	Alternative						
	A	B	C	D	E	F	G
RW-Recommended Wilderness	1,818,213 1/	0	0	0	1,818,213	0	0
WW-Wilderness 2/	2,373,509	2,373,509	2,373,509	2,373,509	2,373,509	2,373,509	2,373,509
WM-Wilderness National Monument 3/	3,096,446	3,096,446	3,096,446	3,096,446	3,096,446	3,096,446	3,096,446
NM-Nonwilderness National Monument	163,033	163,033	163,033	163,033	163,033	163,033	163,033
RA-Research Natural Area 2/3/	67,684	104,338	64,010	27,710	37,934	68,998	63,342
PR-Primitive Recreation	3,619,211	4,554,701	3,144,980	1,529,856	2,904,548	3,800,288	3,758,332
MW-Enacted Municipal Watersheds	9,733	9,733	9,733	9,733	9,733	9,733	9,733
OG-Old Growth	994,043	337,735	595,717	51,340	441,002	544,421	528,750
SP-Semi-primitive Recreation	999,164	1,658,159	634,306	3,369,626	432,909	597,490	555,325
EF-Experimental Forest	48,836	71,770	17,199	17,199	17,199	17,199	17,199
SV-Scenic Viewshed	898,706 (143,217)	1,042,958 (313,432)	570,714 (135,528)	209,059 (27,918)	479,775 (50,374)	527,412 (77,453)	516,996 (73,238)
VT-Visual-Timber	1,266,856 (168,285)	574,847 (108,258)	1,006,843 (166,059)	161,651 (8,984)	815,256 (59,150)	946,982 (94,354)	959,593 (91,110)
RN-Roaded Natural/Rural Recreation	77,118 (14,544)	85,600 (30,163)	833,770 (229,102)	129,784 (35,410)	631,139 (77,526)	722,741 (245,426)	703,476 (113,081)
TM-Timber Production	1,097,337 (209,875)	2,262,260 (637,071)	3,998,688 (1,219,033)	5,363,379 (1,381,683)	3,392,442 (532,644)	3,679,245 (817,778)	3,792,102 (834,319)
MM-Minerals 4/	15,287	138,833	28,853	33,570	28,853	28,613	28,613
BF-Beach Fringe and Estuary	383,147	565,485	187,849	229,610	138,019	179,250	178,345
SL-Stream and Lake Protection	82,478	94,940 (11,597)	298,717	263,579	244,357	268,767	279,333
SA-Special Areas	6,231	6,231	6,231	6,231	6,231	6,231	6,231
WR-Wild Rivers 5/	90/1,206	45/632	0	21/365	0	0	0
SR-Scenic Rivers 5/	12/137	12/150	0	4/45	0	0	0
RR-Recreation Rivers 5/	17/161	14/144	0	3/14	0	0	0

1/ Within RW-Recommended Wilderness, there are 58,719 acres of RA-Research Natural Areas.
2/ Within WW-Wilderness there are 30,093 acres of RA-Research Natural Areas and 329,000 acres of SA-Special Areas.
3/ Within WN-Wilderness National Monument, there are 85,949 acres of RA-Research Natural Areas and 102,251 acres of SA-Special Areas.
4/ Total Forest acreage for all alternatives is 17,001,745. Discrepancies result from an overlap of MM-Minerals with other prescriptions.
5/ Number of river segments/miles of river

( )Acres suitable for timber harvesting.

TABLE 2-6
COMPARISON OF ALTERNATIVE OUTPUTS AND EFFECTS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E*	*Alternative F*	*Alternative G*
Designated Wilderness, and Roadless Lands Remaining (acres)							
after 10 years	15,470,000	14,881,000	14,836,000	14,593,000	15,269,000	14,951,000	14,947,000
after 50 years	14,943,000	13,443,000	13,303,000	12,747,000	14,407,000	13,567,000	13,571,000
Wild and Scenic Rivers							
# of rivers	112 rivers	67 rivers	0 rivers	28 rivers	0 rivers	0 rivers	0 rivers
total miles	1504 miles	926 miles	0 miles	424 miles	0 miles	0 miles	0 miles
Recommended Wilderness (acres) (also in roadless acres above)	1,800,000	0	0	0	1,800,000	0	0
Research Natural Areas (acres)							
outside Wilderness	67,684	106,799	69,038	35,302	37,934	68,998	63,342
inside Wilderness	174,761	116,042	116,042	116,042	116,042	116,042	116,042
Timber Harvest Areas with a Scenic Quality Emphasis (acres)	899,000	1,043,000	571,000	209,000	480,000	527,000	517,000
Recreation Allocations (acres)							
Primitive (outside Wilderness)	3,619,000	4,555,000	3,145,000	1,530,000	2,905,000	3,800,000	3,758,000
Semi-primitive	1,005,000	1,664,000	641,000	3,369,000	439,000	604,000	562,000
Roaded Natural/Rural	77,000	87,000	834,000	130,000	631,000	723,000	703,000
Allowable Sale Quantity (MMBF) (First Decade)	181	354	450	550	280	389	390
Suitable Forest Lands (acres)	536,000	1,101,000	1,200,000[1]	1,454,300	717,000/	1,111,000/	1,112,000/
Annual Rate of Harvest (acres) (First Decade)	5,970	12,170	15,350	18,540	9,250	13,370	13,420
Present Net Value (dollars)	4,383,000,000	4,182,000,000	4,393,000,000	4,317,000,000	4,449,000,000	4,386,000,000	4,392,000,000
Forest Budget Level (dollars)	57,974,000	91,619,000	95,914,000	110,581,000	70,370,000	88,534,000	88,767,000

[1]The current Tongass Plan has 1.75 million acres of suitable land scheduled. Reanalysis of current information indicates only 1.2 million acres of the suitable forest lands would be scheduled to attain the allowable sale quantity.

TABLE 2-6 (Continued)
COMPARISON OF ALTERNATIVE OUTPUTS AND EFFECTS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative E1*	*Alternative F1*	*Alternative G1*
Designated Wilderness, and Roadless Lands Remaining (acres)			
after 10 years	14,968,000	14,889,000	14,873,000
after 50 years	13,641,000	13,435,000	13,398,000
Wild and Scenic Rivers			
# of rivers	0 rivers	0 rivers	0 rivers
total miles	0 miles	0 miles	0 miles
Recommended Wilderness (acres) (also in roadless acres above)	1,800,000	0	0
Research Natural Areas (acres)			
outside Wilderness	37,934	68,998	63,342
inside Wilderness	116,042	116,042	116,042
Timber Harvest Areas with a Scenic Quality Emphasis (acres)	480,000	527,000	517,000
Recreation Allocations (acres)			
Primitive (outside Wilderness)	2,905,000	3,800,000	3,758,000
Semi-primitive	439,000	604,000	562,000
Roaded Natural/Rural	631,000	723,000	703,000
Allowable Sale Quantity (MMBF) (First Decade)	378	420	430
Suitable Forest Lands (acres)	1,086,000	1,158,000	1,180,000
Annual Rate of Harvest (acres) (First Decade)	13,090	14,410	14,720
Present Net Value (dollars)	4,366,500,000	4,381,700,000	4,384,700,000
Forest Budget Level (dollars)	87,604,000	92,374,000	93,670,000

TABLE 2-7
COMPARISON OF ALTERNATIVES BY PRESCRIPTION GROUP
All figures are in millions of acres.

	Alternative						
Prescription Group 1/	A	B	C	D	E	F	G
Wilderness	7.45	5.63	5.63	5.63	7.45	5.63	5.63
Natural Setting	6.16	7.32	4.94	5.48	4.20	5.47	5.38
Moderate Development	2.27	1.65	2.41	0.49	1.93	2.19	2.17
Intensive Development	1.12	2.40	4.02	5.40	3.42	3.71	3.82

1/ For an explanation of the prescription groups, see the introduction to Chapter 3.

On a forest-wide basis, all alternatives assign the majority of Tongass National Forest acres to prescriptions which preserve or maintain the natural environment. Combining the acreages in the Wilderness and Natural Setting prescription groups for each alternative gives the percentages of lands that would be managed in an undeveloped condition (Table 2-8). See also the alternative maps in the map packet.

TABLE 2-8
RANKING OF ALTERNATIVES BY NON-DEVELOPMENT PRESCRIPTIONS

Alternative	Wilderness or Natural Setting Allocations (Percent of Forest)
A	80
B	76
E	69
D	65
F	65
G	65
C	62

Although the alternatives all allocate a majority of lands in this fashion, there is considerable difference in how much. Alternatives A and B each assign over 75 percent of the land area to prescriptions that will maintain natural characteristics such as scenic quality, primitive and semi-primitive recreation opportunities, and undisturbed fish and wildlife habitats and subsistence opportunities. Alternatives C, D, E, F and G provide fewer acres in these prescriptions, ranging from 69 percent (Alternative E) to 62 percent (Alternative C). The 18 percent spread between Alternatives A and C equates to a difference of about 3,000,000 acres.

Opportunities for resource production and use, especially timber harvest and mining, and for maintaining the corresponding contribution to local economies, are roughly the reverse of the rankings in Table 2-8. Some variation in the order results from the relative amounts of Moderate Development and Intensive Development acres for each alternative. Table 2-9 shows the allocations of the Intensive Development prescriptions by alternative, again as a percent of total acres. The 25 percent spread between Alternatives D and A equates to a difference of about 4,250,000 acres.

TABLE 2-9
RANKING OF ALTERNATIVES BY INTENSIVE DEVELOPMENT PRESCRIPTIONS

Alternative	Intensive Development Allocations (Percent Total Area)
D	32
C	24
G	22
F	22
E	20
B	14
A	7

In the future, in the lands managed under the Wilderness and Natural Setting groups, natural diversity and natural habitats will be maintained. In the Moderate Development and Intensive Development groups, diversity will change as a result of land- and vegetation-altering activities. Several decades into the future, large areas of the Forest would show a mosaic of timber harvest units of varying sizes and ages, interspersed with areas of old growth, riparian habitats, and wetlands.

Natural scenery will predominate within Wilderness and the Natural Setting prescriptions, whereas in the Moderate Development group some evidence of alterations will be seen. The Intensive Development group will present a highly modified environment, with roads and timber harvest activities readily apparent over large areas. A wide variety of recreation opportunities will exist forest-wide under all alternatives, although changes towards more developed and road-related recreation uses will occur in areas managed under the prescriptions of the Moderate and Intensive Development groups.

The comparisons will now focus on each of the ten public issues.

Scenic Quality

The prescriptions in the Wilderness and Natural Setting prescription groups generally do not allow land-altering activities or non-natural developments that would affect scenic quality. (Exceptions include fish habitat improvements and

salvage logging under some prescriptions.) Lands managed under the prescriptions in these groups would have no reductions in visual quality.

Three of the four prescriptions in the Moderate Development group (representing the bulk of the acres in that group) were specifically designed to meet visual quality objectives: Scenic Viewshed, Visual-Timber and Roaded Natural/Rural Recreation. These prescriptions all allow moderate amounts of timber harvest and other activities that change the natural setting, but in ways that only slightly affect visual quality. They can be applied to areas such as those seen from the Alaska Marine Highway, or within or adjacent to recreation places, where visual quality and forest products are both important. Lands managed under the prescriptions in the Moderate Prescription group could have slight to moderate reductions in visual quality.

Table 2-10 gives a relative ranking of alternatives based on visual quality emphasis and the potential to maintain the natural appearance of the Forest..

TABLE 2-10
ALTERNATIVE COMPARISONS: VISUAL QUALITY EMPHASIS
Ranking of Alternatives Based on Prescriptions that Maintain or Emphasize Visual Quality 1/

Greatest Emphasis <-------------------------------------> Least Emphasis

A	B	E	F	G	C	D

1/ Total acres in the Wilderness, Natural Setting and Moderate Development prescription groups.

Recreation

The prescriptions offer a wide variety of opportunities and settings for recreation. Those in the Wilderness and Natural Setting groups primarily offer primitive and semi-primitive opportunities in natural, unroaded settings, although some forms of traditional, motorized access are allowed (mainly by air or water). Prescriptions in the Moderate Development group, in particular Roaded Natural/Rural Recreation, offer more-modified settings where access, often by road, is easier.

Not all the land area within the above prescriptions is actually used for recreation purposes, primarily due to the difficulty of access and other geographic restrictions (steep forested slopes, icefields, etc.). Thus the analysis of Tongass National Forest recreation use centers on identified "recreation places" where use occurs. Outside of Wilderness, three prescriptions are used to emphasize the different opportunities related to these recreation places, and other areas with recreation potential. These are Primitive Recreation, Semi-primitive Recreation, and Roaded Natural/Rural Recreation.

Acres in the Wilderness group, plus acres in these three prescriptions, are used to compare the alternatives for recreation opportunities. Table 2-11 lists the acres in these four categories by alternative. The alternatives are ranked by

total acres, but it should be remembered that the mix of opportunities by alternative varies: those that offer fewer overall natural settings may also offer more vehicle access to modified settings.

TABLE 2-11
ALTERNATIVE COMPARISONS: RECREATION EMPHASIS

Alternatives (Ranked by total acres)	Wilderness, Primitive, Semi-primitive Prescription (acres)	Roaded Natural/ Rural Recreation (acres)
A	11,912,774	77,118
B	11,689,046	85,600
E	10,631,856	631,139
F	9,873,964	722,741
D	10,369,457	129,784
G	9,789,843	703,476
C	9,255,472	833,770

Fish Habitat

The Stream and Lake Protection prescription is applied to fish streams in all alternatives. (The variation in acres in Table 2-5 results from more-restrictive prescriptions being applied to areas with streams in some alternatives. Stream and Lake Protection is the minimum level of protection that would occur.) As indicated in Chapter 3, no measurable effects on fisheries have been identified for any alternative. All alternatives provide for habitat improvement projects. There is no significant difference in alternatives for the fish issue.

Wildlife Habitat

All prescriptions within the Wilderness and Natural Setting groups will serve to protect and maintain the natural environments for wildlife species of the Tongass. The ranking of alternatives shown in Table 2-8 indicates the relative merits of the alternatives in this regard.

Since wildlife-associated old growth is the most important habitat type of the Tongass, and the type most subject to change by resource activities, the total amount of productive old growth (currently 5.16 of the 8.81 million acres of old-growth forest), and the high-volume component of old growth, are good indicators to use in comparing alternatives. Table 2-12 shows the relative ranking of alternatives based on the amount of old-growth habitat remaining after 10, 50 and 150 years of management. Comparing this table to Table 2-8 shows that Alternatives A, B and E, maintain the highest amounts of wildlife habitat using either indicator. Alternative D drops to last place for the old growth indicator, having the highest level of intensive timber management.

TABLE 2-12
ALTERNATIVE COMPARISONS: OLD-GROWTH HABITAT
Ranking of alternatives based on old-growth habitat remaining after 10, 50 and 150 years. (All figures are in millions of acres.) Total Productive Old Growth Habitat is based on 5,512,000 acres in 1954 (100%) and High Volume Old Growth of 919,700 acres in 1954 (100%). In 1988, there were 5,159,000 acres of Productive Old Growth and 580,900 acres of High Volume Old Growth remaining.

	Total Productive Old-Growth Habitat			Higher-Volume Old-Growth Habitat[1]		
Alterna-tives	10 Years	50 Years	150 Years	10 Years	50 Years	150 Years
A	5.122	4.912	4.813	0.548	0.496	0.458
B	5.061	4.570	4.256	0.545	0.452	0.419
E	5.089	4.758	4.598	0.552	0.434	0.414
E1	5.028	4.551	4.255	0.531	0.418	0.386
F	5.050	4.548	4.256	0.544	0.414	0.383
G	5.050	4.548	4.256	0.542	0.410	0.379
F1	5.015	4.502	4.186	0.528	0.407	0.376
G1	5.012	4.488	4.160	0.528	0.404	0.372
C	5.028	4.488	4.151	0.532	0.400	0.366
D	4.995	4.377	3.914	0.510	0.370	0.361

[1] Higher-volume old growth is that portion of the old growth in Strata C and D, as discussed in Chapter 3.

Subsistence

Subsistence use is analyzed by three factors in Chapter 3: abundance and distribution, competition, and access. In general, alternatives that best maintain or preserve the natural environment also maintain the most subsistence opportunities, although local variations are important. The findings for abundance and distribution in Chapter 3 are shown in Table 2-13, giving a ranking of alternatives based on meeting the demand for subsistence use. Sitka black-tailed deer is used as the indicator, since it is the most important subsistence species (in terms of numbers used). Under all alternatives there is the potential for a significant restriction on subsistence opportunities in the Chatham Administrative Area of the Forest, where abundance and distribution of brown bear, deer and marten could fall short of the expected demand even with no further resource development.

While no alternatives will restrict subsistence access, those with the highest level of new road development will provide the most new access for subsistence users (see the "roads" table below). Conversely, more road access and development brings the potential for more competition, and the subsistence effects may be reversed. Effects from increased competition (from non-subsistence users) are likely to be seen most in areas where abundance and distribution could fall short of expected demand.

TABLE 2-13
ALTERNATIVE COMPARISONS: EFFECTS ON SUBSISTENCE USE 1/
Ranking of Alternatives Based on Potential Reductions In Abundance and Distribution of Sitka Black-tailed deer 1/

Least Effect <--> Greatest Effect						
A	E	B	G	F	C	D

1/ Abundance and Distribution Is used as the indicator for overall effects of subsistence use.

Timber Harvest

Four management prescriptions: Timber Production, Roaded Natural/Rural Recreation, Visual-Timber, and Scenic Viewshed, are used in the alternatives for planned and scheduled (that is, excluding salvage logging) timber harvest. Within that area, timber harvest will only occur on lands suitable and scheduled for timber harvest. Table 2-14 lists the alternatives in order of the amount of productive timber land available for timber harvest.

TABLE 2-14
ALTERNATIVE COMPARISONS: AVAILABLE AND SUITABLE TIMBERLANDS
(All figures are in millions of acres.)

Alternatives (Ranked by Total Acres)	Productive Forest Lands	
	Available	Suitable Scheduled
D	2.11	1.45
C	2.29	1.20 [1]
G1	2.16	1.11
G	2.16	1.11
F1	2.10	1.11
F	2.10	1.11
B	1.49	1.10
E1	1.92	1.09
E	1.92	0.72
A	1.29	0.54

[1] Suitable lands in the current Tongass Forest Plan as amended are 1.75 million acres. Current data and reanalysis indicates only 1.2 million acres would be scheduled to attain the allowable sale quantity.

Forest-wide there are 3.05 million acres of available timber lands: the most actually available under an alternative is 2.29 million (Alternative C). The suitable lands (those actually scheduled for timber harvest to meet an alternative's objectives) also roughly follow this pattern, but there are exceptions. Alternative D, which relies heavily on the Timber Production prescription and has the highest allowable sale quantity of any alternative, selects a higher percentage (69 percent) of available lands for harvest than most alternatives. Alternative B, which has fewer acres within which to meet long-term contract requirements (see the

Timber discussion in Chapter 3), selects the highest percentage (74 percent) of available lands for harvest.

Only a fraction of acres allocated to a few of the management prescriptions are actually available to be considered for timber harvesting. The management prescriptions that allow timber harvest, and the amount of suitable forest lands within each prescription by alternative, are shown in Table 2-15.

TABLE 2-15
PERCENT SUITABLE ACRES BY MANAGEMENT PRESCRIPTION[1]

	Management Prescription			
Alternatives	Scenic Viewshed	Visual-Timber	Roaded Natural/Rural Recreation	Timber Production
A	16%	13%	19%	19%
B	30%	19%	35%	28%
C	24%	16%	27%	44%
D	13%	6%	27%	26%
E	10%	7%	12%	16%
E1	15%	11%	18%	24%
F	15%	10%	34%	22%
F1	11%	7%	25%	23%
G	14%	9%	16%	22%
G1	13%	8%	14%	23%

[1] Shown are the four prescriptions with scheduled timber harvest.

Note that in all alternatives except Alternative C, less than 30 percent of the area colored green on the alternative maps in the map packet would ever be harvested over the 150 year planning horizon. The average rate of harvest forest-wide by alternative, based on the average annual allowable sale quantity, is shown in Table 2-16.

TABLE 2-16
ALTERNATIVE COMPARISONS: RATE OF TIMBER HARVEST

Alternative	Average Annual Rate of Timber Harvest (Acres)[1]
D	15,500
C	13,700
G1	12,900
B	12,700
F1	12,700
F	12,700
G	11,300
E1	10,600
E	8,500
A	5,300

[1] Average of harvest acres shown in Table 3-110.

The level of timber harvest (the allowable sale quantity) in the alternatives gives a slightly different ranking than the available forest lands. This is shown in Table 2-17.

TABLE 2-17
ALTERNATIVE COMPARISONS: ALLOWABLE SALE QUANTITY

Alternative	1st Decade Average Annual Allowable Sale Quantity (Million Board Feet)
D	550
C	450
G1	430
F1	420
G	390
F	389
E1	378
B	354
E	280
A	181

Roads

Table 2-18 ranks the alternatives in terms of new road construction over the first five decades (1991-2040). The order corresponds to the amount of timber harvest (Table 2-17), which is the primary activity requiring road construction, with the exception of Alternative B, which is relatively higher in road construction (see preceding discussion).

TABLE 2-18
COMPARISON OF ALTERNATIVES: NEW ROAD CONSTRUCTION

Alternative	Average Annual New Road Construction (miles) Decade 1	2	3	4	5
D	293	278	52	55	63
C	234	225	52	55	63
G1	225	216	50	44	48
B	223	217	43	48	41
F1	221	212	50	43	48
G	207	201	48	40	45
F	206	202	49	40	45
E1	202	193	47	40	42
E	129	126	32	26	25
A	80	78	18	17	15

The opportunities for future major transportation corridors in Southeast Alaska are discussed in the Lands and Transportation sections of Chapter 3. No allocations preclude such developments under any alternative.

Minerals

Minerals access is open under the majority of management prescriptions, but withdrawal from new mineral entry is a part of the Wilderness, National Monument Wilderness and non-Wilderness, Research Natural Area, Enacted Municipal Watershed, and Wild River prescriptions, and may occur with some Special Areas. The Wilderness prescriptions account for the majority of withdrawn lands. Using the acres from Table 2-5, Table 2-19 ranks the alternatives in terms of access for mineral entry.

TABLE 2-19
ALTERNATIVE COMPARISONS: ACCESS FOR MINERAL ENTRY
Ranking alternatives on amount of lands open to mineral entry 1/

Greatest Emphasis <-------------------------------------> Least Emphasis						
G	C	F	D	B	E	A

1/ Areas not allocated to Wilderness, National Monument Wilderness or non-Wilderness, Research Natural Area, Enacted Municipal Watersheds, Wild River and Special Area prescriptions.

Areas with identified high potential for mineral development (see Minerals in Chapter 3) have been allocated to the Minerals prescription variously by alternative. Alternative B provides the highest allocation, 138,833 acres. These allocations are made to recognize the importance of the mineral potential of these areas, but overlap with other prescriptions which will be applied until such time as an area is developed.

Roadless Areas

The majority of Tongass National Forest lands are in a roadless condition, and will remain so under all alternatives. The prescriptions in the Wilderness and Natural Setting groups, with only minor exceptions, will all maintain roadless characteristics, and some areas within the other prescriptions will also stay roadless, due to lack of access or development potential. Total roadless acres for each alternative are shown in Table 2-20.

Alternatives A and E will add an additional 1.8 million acres of roadless areas to the National Wilderness Preservation System. No other alternatives have recommendations for increases to the wilderness system.

TABLE 2-20
ALTERNATIVE COMPARISONS: ROADLESS AREAS
Ranking of alternatives based on roadless areas remaining after 50 years.

Alternatives	Roadless Areas (acres)
A	14,943,000
E	14,407,000
E1	13,641,000
F	13,567,000
G	13,571,000
B	13,443,000
F1	13,435,000
G1	13,398,000
C	13,303,000
D	12,747,000

Local Economy

Potential effects on each of Southeast Alaska's communities are discussed in detail in Chapter 3. That analysis can't be summarized Forest-wide. The comparisons here will focus on overall employment and receipts to the State.

Employment in Southeast Alaska related to National Forest lands and activities is not expected to change across alternatives, except in the timber industry. (Other segments include commercial fishing, recreation and tourism, and mining.) Predicted timber employment is directly related to the timber supply. Table 2-21 shows total and timber-related employment by alternative.

TABLE 2-21
ALTERNATIVE COMPARISONS: SOUTHEAST ALASKA EMPLOYMENT
Potential employment levels related to the outputs associated with each alternative. Figures are in numbers of jobs for the first decade.

Alternatives	Total Employment	Timber Employment
D	18,350	5,525
C	17,325	4,500
G1	17,150	4,325
F1	17,000	4,175
G	16,800	3,975
F	16,725	3,900
E1	16,450	3,625
B	16,275	3,450
E	15,600	2,775
A	14,650	1,825

The Tongass National Forest provides 25 percent of its annual gross revenues (from timber sales, special use fees, and other revenues) to the State of Alaska. These funds are to be used for roads and schools. Gross receipts for the Tongass come almost entirely from timber sales, and are thus directly related to the timber harvest level. Table 2-21 can be used for the relative ranking of alternatives in providing payments to the State. Based on anticipated market conditions, payments during the first decade are expected to range from a high of $19,250,000 (Alternative D) to a low of $6,775,000 (Alternative A).

In addition to the ten issues, three other areas will now be discussed briefly for alternative comparisons. Two are the other two items shown under goals and objectives for each alternative: wild, scenic and recreation rivers, and research (including Research Natural Areas and Experimental Forests). The third includes some economic comparisons.

Wild, Scenic and Recreation Rivers

Three alternatives display tentatively eligible rivers consistent with the theme of those alternatives. Alternative A has 1,504 miles, Alternative B has 926 miles, and Alternative D has 424 miles. Alternatives C, E, F and G do not include rivers.

Research

Total Research Natural Area allocations (existing and new) are displayed by alternative in Table 2-22. Each alternative includes recommendations for new areas. The table also lists Experimental Forest prescription acres. Only alternatives A and B recommend new Experimental Forests.

TABLE 2-22
ALTERNATIVE COMPARISONS: RESEARCH AREAS

Alternative	Research Natural Areas # New Areas	Research Natural Areas Total Acres	Experimental Forests (acres)
A	30	242,445	48,836
B	27	220,370	71,770
F	20	185,040	17,199
C	20	180,052	17,199
G	20	179,384	17,199
E	19	153,976	17,199
D	14	149,983	17,199

Economic Criteria

Two indicators are used to compare the alternatives for economic efficiency: total Forest budget and present net value (PNV). Table 2-23 displays these two items. The total budget corresponds closely to the level of timber management, since that is the activity requiring the highest Forest Service expenditures. The only exception is the somewhat higher budget for Alternative B, required since fewer timber management options were available to meet its harvest level.

The overall indicator of long-term economic efficiency is present net value (explained earlier in this chapter). All alternatives have a positive PNV, with a difference of only six percent between the highest (Alternative E) and the lowest (Alternative B).

TABLE 2-23
ALTERNATIVE COMPARISONS: ECONOMIC INDICATORS
All figures are in millions of dollars. Total budget are average annual first-decade amounts.

Alternatives	Total Budget	Present Net Value
A	58.0	4,383.0
B	91.6	4,182.0
C	95.9	4,393.0
D	110.6	4,317.0
E	70.4	4,449.0
E1	87.6	4,366.5
F	88.5	4,386.0
F1	92.4	4,381.7
G	88.8	4,392.0
G1	93.7	4,384.7

A Difficult Choice

Much of the preceding discussion of issues can be expressed in one basic question: "What amount of timber to make available (or what amount of old growth to retain), and where?" On one side of the question are the concerns over scenic quality, recreation settings, fish and wildlife habitat (including old growth), subsistence use, roadless areas (including Wilderness additions), Wild and Scenic Rivers, and an economic timber supply. On the other side is the concern over timber-related employment, and its relationship to the economies of Southeast Alaska's communities.

Many of the first set of concerns (which could loosely be termed "environmental") have been addressed, and perhaps resolved, by one or more of the alternatives. Several of the management prescriptions were developed, and have been applied, to reduce the potential effects of timber supply on forest resources. The use of and varying success of these has been the focus of the preceding issue discussions. Of particular note, the Stream and Lake Protection prescription, applied in all alternatives to areas where timber harvest will be considered, results in no new adverse effects to the fisheries resource.

The Tongass, at least in most areas where competition for resources is evident, is an old-growth forest. Past, current and future (at least for several more decades) timber harvest must occur in old-growth areas. Since 1954, when harvest began at significant levels, the amount of old growth in the Tongass has steadily declined. Unfortunately, some of the subsistence opportunities, and much of the scenic quality, recreation settings and wildlife habitat, are associated with the natural condition of the Forest's old growth. Continued timber harvest of almost any amount (including that encompassed by the range of alternatives) can only occur with additional reductions in old growth. Reductions in old growth by alternative were displayed in Table 2-12.

Also beginning in 1954, the development of a Southeast Alaska timber industry has meant a significant number of jobs for the area's residents, and has resulted in the growth, even establishment, of many of the area's smaller communities. A decline in the current level of harvest opportunities from the Tongass will probably mean a loss of timber-related employment, and could significantly and adversely affect some of these communities.

When second-growth timber in the Forest begins to reach harvestable size, the need for old growth to sustain harvest levels will lessen. In approximately 150 years, each alternative will reach a point where no more old-growth forest need be harvested to sustain the desired timber supply. At that time, 71 percent (Alternative D) to 87 percent (Alternative A) of the 1954 amount of productive old growth will still remain: 82 to 92 percent of the total old-growth forests existing today in the Tongass.

But for the next several decades, timber harvest will be dependent on old-growth forest areas. Figure 2-3 shows the relationship between old growth harvest and timber employment for the next decade: on the average, one annual timber job equates to about three acres of old growth harvested. This is really then the "bottom line" for future management of the Tongass, finding the appropriate balance between continued timber-related employment and old-growth habitat decline.

FIGURE 2-3

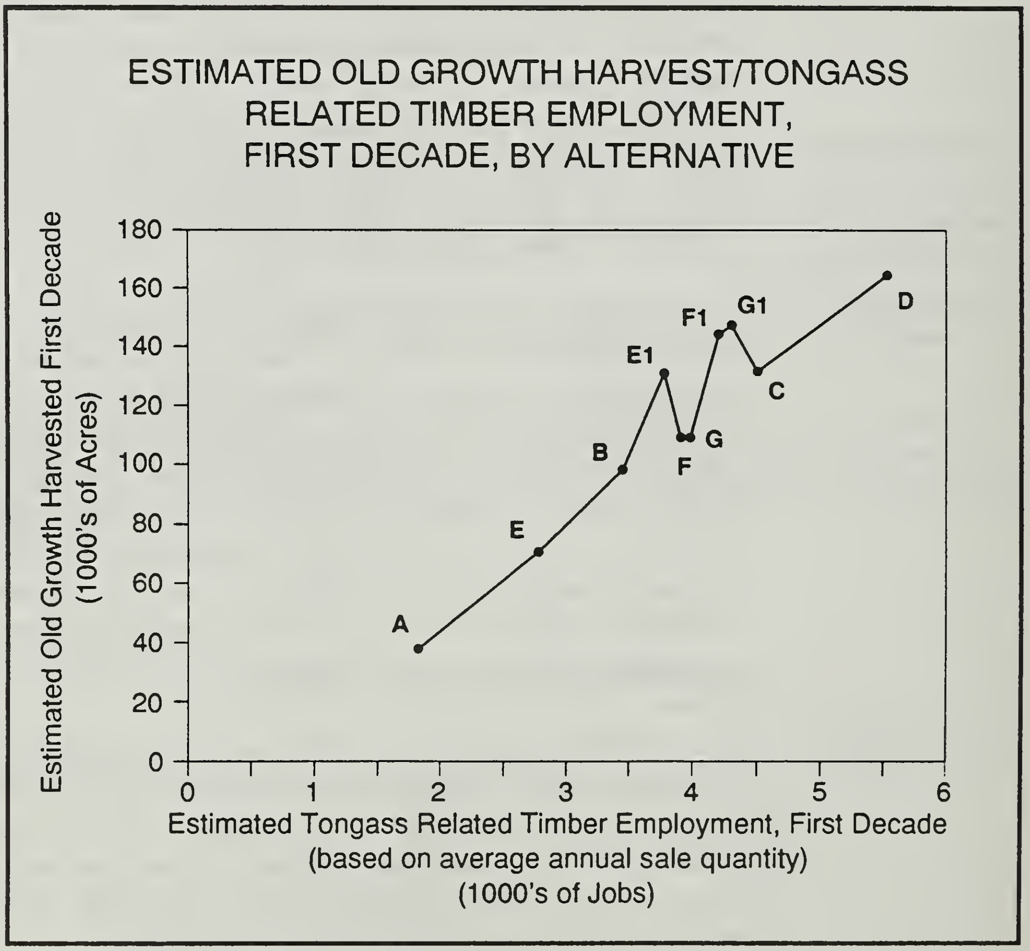


TABLE 2-24
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E_1*	*Alternative F/F_1*	*Alternative G/G_1*
Recreation Capacity (MRVD's)	4,271	4,249	4,240	4,219	4,281/4,261	4,231/4,258	4,237/4,182
% Productive Old Growth Remaining, including Wilderness							
% currently remaining (1988)	94	94	94	94	94/94	94/94	94/94
% remaining after 10 years	94	92	91	91	92/91	92/91	92/91
% remaining after 50 years	92	83	81	79	86/83	83/82	83/81
% remaining after 150 years	88	77	75	71	83/77	77/76	77/75
% Strata C & D Old Growth [1] Remaining, including Wilderness							
% currently remaining (1988)	63	63	63	63	63/63	63/63	63/63
% remaining after 10 years	59	59	58	55	60/58	59/57	59/57
% remaining after 50 years	53	49	43	40	47/45	45/44	45/44
% remaining after 150 years	49	46	40	39	45/42	42/41	41/40
Wilderness (acres)	7,200,000	5,400,000	5,400,000	5,400,000	7,200,000	5,400,000	5,400,000
Commercial Fish Enhancement by end of 1st decade (pounds)	12,000,000 121 projects	12,000,000 121 projects	12,000,000 121 projects	12,000,000 121 projects	12,000,000 121 projects	12,000,000 121 projects	12,000,000 121 projects
Suitable Lands for Timber Harvest (M acres)	536	1,101	1,750[2]	1,454	717/1,086	1,111/1,136	1,112/1,159

[1] Strata C and D represent the higher-volume components of old growth.
[2] As shown in TLMP amended, 1986. Current data indicates only 1.2 million acres would be scheduled to attain the allowable sale quantity.

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
Allowable Sale Quantity [1]							
Decade 1 (MMBF)	181	354	450	550	280/378	389/420	390/430
Decade 5 (MMBF)	143	315	361	422	227/318	328/339	330/345
Decade 1 (MCF)	35	76	87	101	54/77	79/82	79/84
Decade 5 (MCF)	35	76	87	101	54/77	79/82	79/84
Long-Term Sustained Yield (MCF)	51	101	111	130	71/94	102/100	102/102
Utility Volume [1]	30	50	70	90	40/59	60/65	60/67
Decade 1 (MMBF)	28	54	70	86	44/59	60/65	60/67
Decade 5 (MMBF)	21	47	51	61	34/44	47/47	46/50
Decade 1 (MCF)	5	12	14	16	8/12	12/13	12/13
Decade 5 (MCF)	5	11	12	15	8/11	11/12	11/12
Reforestation (Acres)							
Decade 1	6,000	12,200	15,400	18,500	9,200/13,100	13,400/14,400	13,400/14,700
Decade 5	5,100	12,200	12,900	15,200	7,700/11,500	11,900/12,200	11,900/12,400
Precommercial Thinning (Acres)							
Decade 1	0	500	0	0	200/124	0/0	0/0
Decade 5	0	500	600	0	0/559	1,600/1,590	1,600/1,560
Road Construction (Miles)							
Decade 1	80	223	234	293	129/202	206/221	207/225
Decade 2	78	217	225	278	126/193	202/212	201/216
Decade 3	18	43	52	52	32/47	49/50	48/50
Decade 4	17	48	55	55	26/40	40/43	40/44
Decade 5	15	41	63	63	25/42	45/48	45/48

[1]The cubic foot (CF)/board foot (BF) ratio, and the concept of non-declining even flow, are explained in the introduction to Alternatives Considered in Detail. Long-term sustained yield is expressed only in cubic feet.

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
1954 Red Squirrel Habitat Capability Remaining (%)							
% currently remaining (1988)	98	98	98	98	98/98	98/98	98/98
% remaining after 10 years	98	98	97	97	97/96	98/96	98/96
% remaining after 50 years	97	95	94	94	97/92	95/91	95/91
% remaining after 150 years	98	95	95	94	98/93	96/92	96/92
1954 Brown Creeper Habitat Capability Remaining (%)							
% currently remaining (1988)	65	65	65	65	65/65	65/65	65/65
% remaining after 10 years	60	59	59	57	61/60	60/60	60/60
% remaining after 50 years	55	50	42	40	47/45	44/44	43/44
% remaining after 150 years	51	46	37	37	44/41	39/39	38/38
1954 Red Breasted Sapsucker Habitat Capability Remaining (%)							
% currently remaining (1988)	96	96	96	96	96/96	96/96	96/96
% remaining after 10 years	95	94	93	92	94/94	93/93	93/93
% remaining after 50 years	91	85	82	81	89/84	83/83	84/83
% remaining after 150 years	90	80	77	74	86/79	78/77	79/77
1954 Hairy Woodpecker Habitat Capability Remaining (%)							
% currently remaining (1988)	86	86	86	86	86/86	86/86	86/86
% remaining after 10 years	84	83	82	81	84/82	83/81	83/81
% remaining after 50 years	79	72	67	65	74/68	69/67	69/67
% remaining after 150 years	76	67	60	58	70/62	62/60	62/59

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
1954 Marten Habitat Capability Remaining (%)							
% currently remaining (1988)	95	95	95	95	95/95	95/95	95/95
% remaining after 10 years	94	93	92	92	93/93	93/93	93/93
% remaining after 50 years	90	85	82	80	87/84	83/83	83/83
% remaining after 150 years	89	81	77	74	84/79	78/78	78/78
1954 Bald Eagle Nesting Habitat [1] Capability Remaining (%)							
% currently remaining (1988)	91	91	91	91	91/91	91/91	91/91
% remaining after 10 years	91	91	84	84	88/85	86/84	86/83
% remaining after 50 years	90	90	72	70	82/72	73/69	75/68
% remaining after 150 years	90	90	65	65	79/66	67/60	66/59
1954 River Otter Habitat Capability Remaining (%)							
% currently remaining (1988)	93	93	93	93	93/93	93/93	93/93
% remaining after 10 years	93	93	88	88	90/89	89/88	89/88
% remaining after 50 years	92	92	77	77	85/77	78/75	78/75
% remaining after 150 years	92	92	74	74	83/74	75/72	75/71
1954 Black Bear Habitat Capability Remaining (%)							
% currently remaining (1988)	100	100	100	100	100/100	100/100	100/100
% remaining after 10 years	100	100	100	100	100/100	99/99	100/100
% remaining after 50 years	97	93	90	89	94/92	91/91	91/90
% remaining after 150 years	95	90	85	83	91/89	88/87	87/86

[1] About 66 percent of habitat is needed to support the existing population.

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
1954 Brown Bear Habitat Capability Remaining (%)							
% currently remaining (1988)	99	99	99	99	99/99	99/99	99/99
% remaining after 10 years	99	98	98	98	99/99	98/98	98/98
% remaining after 50 years	98	96	95	95	97/94	95/94	94/94
% remaining after 150 years	98	94	94	94	97/91	94/92	92/92
1954 Sitka Deer Habitat Capability Remaining (%)							
% currently remaining (1988)	92	92	92	92	92/92	92/92	92/92
% remaining after 10 years	90	88	87	86	89/88	88/87	88/87
% remaining after 50 years	85	78	74	72	81/75	75/74	75/74
% remaining after 150 years	83	74	66	64	77/70	69/67	69/67
1954 Wolf Habitat Capability Remaining (%)							
% currently remaining (1988)	92	Since Wolf is a predator species, the effects of resource activities on wolf habitat are assumed to be parallel to those of deer. Deer are a primary prey species for the wolf.					
1954 Mountain Goat Habitat Remaining (%)							
% currently remaining (1988)	98	98	98	98	98/98	98/98	98/98
% of 1954 Habitat allocated to NO Timber Harvest Prescriptions	93	91	86	88	87	86	86

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
Commercial Fishing Employment (Number of Jobs)	4,850	4,850	4,850	4,850	4,850	4,850	4,850
Timber Harvest Employment (Number of Jobs)							
National Forest	1,825	3,450	4,500	5,525	2,775/3,625	3,900/4,175	3,975/4,325
Other	825	825	825	825	825/825	825/825	825/825
Total	2,650	4,275	5,325	6,350	3,600/4,450	4,725/5,000	4,800/5,150
Recreation/Tourism Employment (Number of Jobs)	3,675	3,675	3,675	3,675	3,675	3,675	3,675
Mining and Mineral Development Employment (Number of Jobs)	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Sport Fishing Employment (Number of Jobs)	1,450	1,450	1,450	1,450	1,450	1,450	1,450
Big Game Hunting Employment (Number of Jobs)	925	925	925	925	925	925	925
Total Employment (Number of Jobs)	14,650	16,275	17,325	18,350	15,600/16,450	16,725/17,000	16,800/17,150

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

Outputs/Effects (Unit of Measure)	*Alternative A*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E/E$_1$*	*Alternative F/F$_1$*	*Alternative G/G$_1$*
Commercial Fishing Income (Millions of Dollars)	135.8	135.8	135.8	135.8	135.8	135.8	135.8
Timber Harvest Income (Millions of Dollars)							
National Forest	60.2	113.9	148.5	182.3	91.6/119.6	128.7/137.8	131.2/142.7
Other	27.2	27.2	27.2	27.2	27.2/27.2	27.2/27.2	27.2/27.2
Total	87.4	141.1	175.7	209.5	118.8/146.8	155.9/165.0	158.4/169.9
Recreation/Tourism Income (Millions of Dollars)	84.5	84.5	84.5	84.5	84.5	84.5	84.5
Mining and Mineral Development Income (Millions of Dollars)	48.4	48.4	48.4	48.4	48.4	48.4	48.4
Sport Fishing Income (Millions of Dollars)	36.3	36.3	36.3	36.3	36.3	36.3	36.3
Big Game Hunting Income (Millions of Dollars)	21.3	21.3	21.3	21.3	21.3	21.3	21.3
Total Income (Millions of Dollars)	413.7	467.4	502.0	535.8	445.1/473.1	482.2/491.3	484.7/496.7

TABLE 2-24 (cont.)
OTHER ALTERNATIVE COMPARISONS
(Average Annual Outputs/Effects Unless Otherwise Noted)

With Enhancement Projects in the First Decade			*Without Enhancement Projects in the First Decade*		
Year	*Millions of Fish Produced*	*Percent Change from 1954*	*Year*	*Millions of Fish Produced*	*Percent Change from 1954*
% of 1954 Pink Salmon MIS Habitat Capability for all Alternatives (including Wilderness)					
1954	2,394 smolts		1954	2,394 smolts	
1988	2,454 smolts	+ 2.5%	1988	2,454 smolts	+ 2.5%
2000	2,537 smolts	+ 6.0%	2000	2,454 smolts	+ 2.5%
2150	2,513 smolts	+ 5.0%	2150	2,454 smolts	+ 2.5%
% of 1954 Coho Salmon MIS Habitat Capability for all Alternatives (including Wilderness)					
1954	19.1 smolts		1954	19.1 smolts	
1988	19.1 smolts	No Change	1988	19.1 smolts	No Change
2000	up to 23.9 smolts	up to + 25%	2000	19.1 smolts	No Change
2150	up to 28.2 smolts	up to + 47%	2150	19.0 smolts	- 0.5%
% of 1954 Dolly Varden MIS Habitat Capability for all Alternatives (including Wilderness)					
1954	67.9 fish		1954	67.9 fish	
1988	67.4 fish	- 0.7%	1988	67.4 fish	- 0.7%
2000	67.0 to 67.3 fish	- 1.0% to - 1.3%	2000	67.0 to 67.3 fish	- 1.0% to - 1.3%
2150	66.0 to 67.0 fish	- 1.4% to - 2.8%	2150	66.0 to 67.0 fish	- 1.4% to - 2.8%

CHAPTER 3

ENVIRONMENT AND EFFECTS

CHAPTER 3

ENVIRONMENT AND EFFECTS

INTRODUCTION

This chapter combines the "Affected Environment" and "Environmental Consequences" discussions required by the National Environmental Policy Act implementing regulations (40 CFR 1500). Each resource is first described by its current condition, uses, supply and demand. How the resource is measured and evaluated is also explained. The descriptions are limited to providing the background information necessary for understanding how Forest Plan alternatives may affect the resource.

After each resource description, the potential effects (environmental consequences) to the resource associated with implementation of each alternative are discussed. All significant or potentially significant effects, including direct, indirect and cumulative effects are disclosed. Effects are quantified (where possible), although qualitative discussions may also be included. The means by which potential adverse effects will be reduced or mitigated are also described.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Potential adverse environmental effects which cannot be avoided are discussed. Unavoidable adverse effects result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced or mitigated by limiting the extent or duration of effects. Mitigation measures within standards and guidelines are specified for project activities to be implemented under the Revised Forest Plan. These are discussed throughout the chapter.

Short-term uses (effects) are those that occur annually or within the first ten years of Forest Plan implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 year and beyond.

Irreversible and irretrievable resource commitments are normally not made at the programmatic level of a Forest Plan. Irreversible commitments are decisions affecting non-renewable resources such as soils, minerals, plant and animal species, and cultural resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. While the application of management prescriptions allowing land-altering activities can indicate the *potential* for such commitments, the actual commitment to develop, use or affect non-renewable resources is made at the project level. (See the discussion of Implementation in Chapter 1.) The gradual decline in old-growth habitat would be considered an irreversible commitment.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of management prescriptions that do not allow timber harvest to areas containing suitable and accessible timber lands. For the time over which such allocations are made, the opportunity to produce timber from those areas is foregone, thus irretrievable. Irreversible and irretrievable commitments are not identified as such in the discussions.

For estimating the effects of alternatives at the programmatic Forest Plan level, the assumption has been made that the kinds of resource management activities *allowed* under the management prescriptions will in fact occur to the extent necessary to achieve the goals and objectives of each alternative. However, the actual location, design and extent of such activities is not known at this time; that is a project-by-project decision. Thus, in many cases the discussions refer to the *potential* for effects to occur, realizing that in many cases these are only estimates. The effects analysis is useful in comparing and evaluating alternatives, but should not be applied per se to any specific location within the Forest.

In analyzing and evaluating the potential effects from timber harvest activities, keep in mind that the prescriptions allowing different levels of timber harvest apply to broad land areas. These areas typically include both suitable *and* unsuitable timber lands. Within any given area allocated to one of these prescriptions, the actual acres harvested will be less than the prescription acres. Each alternative map in the map packet displays the available lands within the prescriptions where timber harvest *may* occur. As discussed under Timber and in Chapter 2, only a portion of the available lands is needed to meet the timber supply objectives of the alternatives. *Which* suitable acres are harvested is once again a project-level decision.

Prescription Groupings

For many resources, the effects, and the differences in effects by alternative, are best identified through the management prescriptions allocations. While each prescription has a different purpose and management emphasis, some of the prescriptions are similar in the kinds of effects they would potentially create. Based on this concept, and in order to simplify the identification of effects, the management prescriptions have been grouped into four categories: Wilderness, Natural Setting, Moderate Development, and Intensive Development.

Table 3-1 displays the management prescription groupings. Each alternative map also uses these groupings to show the prescription allocations, and prescriptions are color-coded by group. The reader will find it useful to have these maps available when reading the effects discussions. Table 1 excludes the wild, scenic, and recreation river prescriptions, since they do not have acreages assigned to them.

TABLE 3-1
MANAGEMENT PRESCRIPTION GROUPINGS USED TO DISCUSS EFFECTS

Prescription Group	*Management Prescription*
Wilderness	Wilderness Wilderness National Monument Nonwilderness National Monument
Natural Setting	Research Natural Area Primitive Recreation Old-Growth Habitat Beach Fringe and Estuary Enacted Municipal Watersheds Stream and Lake Protection Special Areas Semi-primitive Recreation
Moderate Development	Experimental Forests Scenic Viewshed Roaded Natural/Rural Recreation Visual-Timber
Intensive Development	Timber Production Minerals

Land Divisions

The land area of the Tongass National Forest has been divided up in several different ways to describe the different resources and how they are affected by Forest Plan alternatives. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. Four of these are used for more than one resource, and are described briefly here (more complete descriptions appear elsewhere in the document, as noted).

Geographic Provinces - These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features. Geographic provinces are used in the biological diversity, research natural area, and wild and scenic river sections. See "research natural areas" for a complete description.

Administrative Areas - The Tongass National Forest is divided into three Administrative Areas for management purposes. They correspond roughly to the north, central and southern portions of the Forest. Several resources, including fish, old-growth forests, recreation, roadless areas, wildlife and timber, use these divisions for describing effects. Administrative areas were described in Chapter 1.

Geographic Zones - The 50 geographic zones (or "geozones") are defined by a combination of administrative boundaries (administrative areas, ranger districts and wilderness), long-term sale area boundaries (see discussion under "timber"), and major land divisions (such as large islands). They are discussed in Appendix B, and are used in the fish, soils, subsistence, water and wildlife sections. Figure 3-1 is a map showing the geographic zones.

Value Comparison Units - These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. Value comparison units (VCU's) were used for the current Forest Plan, and are shown on the "no change" alternative map in the map packet. The Forest contains 867 VCU's. They are used in the fish and subsistence sections.

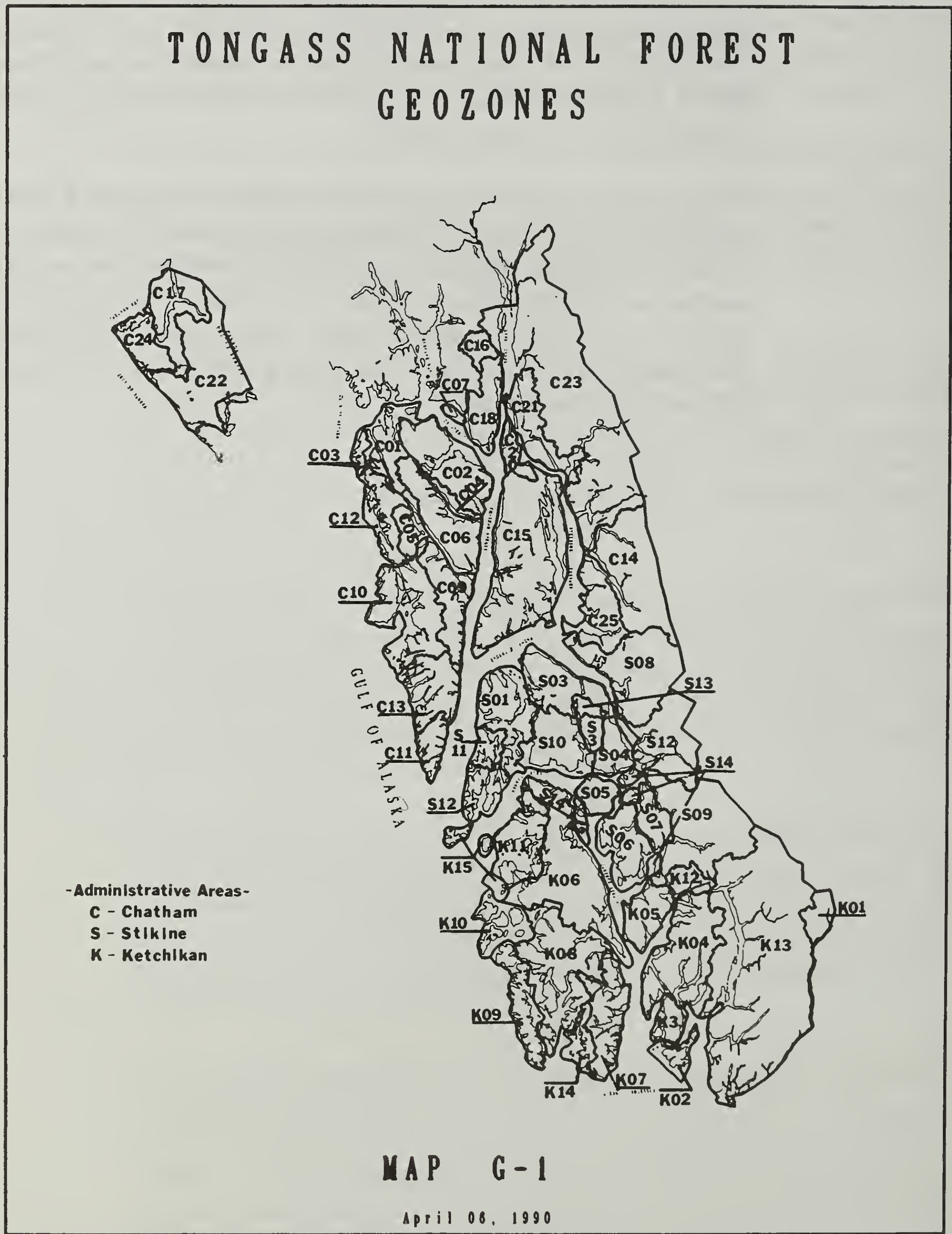
The Tongass National Forest has developed a computerized geographic information system (GIS) for the revision of the Tongass Plan. This system makes it possible to do spatial analysis of alternatives and effects, and to rapidly display resource information in map format. The GIS is a large database, containing information on many of the resources of the Forest. Much of the data consists of map "layers," each representing a particular resource or attribute (such as vegetative species, soil types or recreation places). Numerical data

can also be stored, displayed and analyzed. The GIS data base is referred to as the "Revision Database" when referenced in this chapter.

As explained in Chapter 2, Alternatives E, F and G each have a variation within their objectives for timber management. These options result in differences in the amount and location of lands suitable for timber harvest. For Alternatives F and G these differences are small (less than 50,000 acres Forest-wide), and the corresponding differences in effects Forest-wide are insignificant. For the effects analysis presented in this chapter, no distinction has been made for the options within Alternatives F and G.

The average annual allowable sale quantities for Alternative E and E1 do result in measurable and significant differences. Forest-wide, the effects of Alternative E are essentially the same as those of Alternative B, with two exceptions: timber and social. The differences in Alternatives E and E1 are discussed under the Timber and Social Environment sections of this chapter. For all other resources, the "Alternative E" is analyzed; Alternative B will serve as the "proxy" to display the effects of Alternative E1.

FIGURE 3-1
TONGASS NATIONAL FOREST GEOGRAPHIC ZONES



GENERAL FOREST DESCRIPTION

A brief description of the physical, biological and socio-economic settings of the Tongass National Forest is now given. Chapter 1 and the alternative maps include a location map.

Physical Setting

The mainland and many of the islands of Southeast Alaska are mountainous, often rising abruptly from sea level to several thousand feet. Elevations of forested areas extend up to approximately 3,000 feet in the southern sections of the forest, and up to 2,500 feet farther north. The mountain valleys provide reservoirs for huge ice fields and glaciers, located primarily on the mainland.

More than one million years ago, all but the highest mountain peaks in Southeast Alaska were covered by ice. The great erosional powers of these vast expanses of ice molded and shaped the landscape as the glaciers moved downhill under their own weight, carving the bedrock below them. When the ice receded and uncovered the land, the more resistant mineral-rich rocks remained, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. It is this modification by glaciers that gives Southeast Alaska's landscape its unique character.

The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains provide the factors necessary to produce abundant rainfall. The annual precipitation of Southeast Alaska averages more than 100 inches throughout. Precipitation is highest in the southern areas, and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall annually, perpetuating the existing icefields and glaciers. Storms and moderate to heavy precipitation occur year round, but most commonly from September through November. The abundant moisture feeds numerous streams, rivers, and lakes which dot the landscape.

Southeast Alaska has a maritime climate, resulting from the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from the mid-40's to the mid-60's in the summer, and from the high teens to the low-40's in the winter. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true.

Biological Setting

The coastal forest of Southeast Alaska is part of the cool, temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the forest is composed of old-growth conifers, primarily western hemlock and Sitka spruce, with a scattering of mountain hemlock, western redcedar (in the south) and Alaska yellow-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by logging and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas on the mainland. Subalpine fir and Pacific silver fir occur occasionally at tree-line and near sea level.

Blueberries, huckleberry, Sitka alder, Devil's club, and salal are common shrubs in the forest. The forest floor is composed of plants such as deerheart, dogwood, single delight and skunk cabbage. Because of the high rainfall and resulting high humidity, mosses grow in great profusion on the ground, on fallen logs, on the lower branches of trees, and in forest openings.

Grass-sedge meadows usually lie at low elevations, often along the coast. Stands of willows border many of the stream channels. Interspersed throughout the forest are muskeg (or bog plant) communities, dominated by sphagnum mosses and sedges.

The alpine zone usually lies above 2,500 to 3,000 feet. It occupies the area above the coastal forest and is separated from the forest by a subalpine or transition zone. Resident plants have adapted to snowpack and wind abrasion by evolving low-growth forms. Low, mat-forming vegetation covers most of the area, with cushion-like plants occupying crevices on exposed rock outcrops and talus slopes.

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals, including both game and non-game animals such as brown and black bear, Sitka black-tailed deer, moose, wolf, mountain goat, beaver, otter and marten. The coastline provides an ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Forest, including all five species of Pacific salmon, Dolly Varden, and trout.

Social and Economic Setting

Southeast Alaska's communities and individuals make up a variety of cultures. The abundant resources of the forests and waters have provided food, shelter, and livelihood for to its peoples for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment and developed a rich culture. The numerous waterways allowed for mobility which aided in expanding trade and gathering food.

In the 1700's, Russian exploration began in Alaska. The fur trade, primarily sea otter pelts, was the main force driving colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in its North American colony. Alaska was sold to the United States in 1867.

Colonization continued under United States ownership, and new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast Alaska. During that same period the discovery of gold brought thousands of miners to the area, and many were followed by their families. The most important of the early discoveries occurred in Juneau. In the early 1900's, the Depression brought a decline in mining employment, and the impact of World War II resulted in the closures of the last remaining mines.

The timber resource was used by the earliest inhabitants in a variety of ways. The Russians harvested timber for building ships and structures, but commercial timber harvest was not developed until the 1900's. In the earlier part of the century small timber mills operated in a few communities, and during the 1950's two large-scale pulp mills were developed in Ketchikan and Sitka, and the timber industry became a major economic component of Southeast Alaska's economy.

In the 1950's Alaska focused its attention on statehood, and on January 3, 1959 became our 49th state. This resulted in an increase in government employment, and, coupled with the growth of the timber industry, a gradual shift towards a more diversified economy, with less dependence on non-renewable resources.

Most of the population of Southeast Alaska is concentrated in several urban communities, the largest being Juneau, Ketchikan, Sitka and Petersburg. The same industries most important to Southeast Alaska's history: fishing, mining, and timber production, are still prominent in most of the urban communities. Tourism, which has increased in recent years, provides another important source of income, as do government, education and transportation. There are also many small, rural communities which depend primarily on fishing, timber production and subsistence uses.

AIR QUALITY

AFFECTED ENVIRONMENT

CURRENT SITUATION

The air quality of the Tongass National Forest is rated as pristine. The prevalent airflow from the Pacific Ocean, the small amount of industrial development in Southeast Alaska, and the absence of large population centers all contribute to the high quality of the air. Forest activities have historically had little effect on air quality.

The State of Alaska Department of Environmental Conservation has the primary responsibility for attainment and maintenance of Ambient Air Quality Standards under the provisions of the Clean Air Act (42 U.S.C. 7401 et. seq.).

Air quality is managed by airsheds. Airsheds are geographic areas, which because of topography, meteorology, and climatic conditions, share the same air mass. Airsheds are classified by their degree of protection from future air quality degradation. Airsheds are classed as I, II, or III. Class I airsheds are designated for the most stringent protection. Class II are designated for moderate protection. Class III are designated for a lesser degree of protection than Class I or II.

The Clean Air Act designates as mandatory Class I areas each National Park over 6,000 acres and each national Wilderness over 5,000 acres that existed as of the date of enactment of the Clean Air Act (August 7, 1977). Wilderness and additions to Wildernesses designated by law after this date are not Class I areas unless they have been redesignated as such. To date the State of Alaska Department of Environmental Conservation's Air Quality Control Regulations have not classified any areas in Southeast Alaska as Class I airsheds. As there are no Class III airsheds in Alaska, the entire Tongass National Forest, including the National Monuments and Wildernesses, is a Class II airshed.

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Expected air quality effects from forest management activities are temporary and limited in nature, resulting from dust and vehicular emissions from logging operations, public travel on Forest roads, and smoke from a limited prescribed fire program. No significant adverse effects on air quality are anticipated under any of the alternatives.

BIODIVERSITY

AFFECTED ENVIRONMENT

The National Forest Management Act (NFMA) defines diversity as the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. Biological diversity encompasses the variety of life in an area, including the variety of genetic stocks, species, plant and animal communities, ecosystems, and processes through which individual organisms interact with one another and their environments.

Definition

National Forests are ecosystems and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems. NFMA provides the following direction for diversity (36 CFR 219.26): "Forest Planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices."

Viable Populations

Fish and wildlife habitat is to be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population is one which has the estimated numbers and distribution of reproductive individuals needed to insure its continued existence, well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area (36 CFR 219.19).

Diversity Elements

Discussing and displaying biological diversity for diverse public interest in management of National Forests can be a difficult task. To accomplish this task, and to display qualitative and quantitative biological diversity in the Forest planning process, eight elements of biological diversity have been developed (Figure 3-2) (Orme et al. 1989). These eight elements describe ecological processes and account for changes in biological diversity with various resource management alternatives.

FIGURE 3-2
EIGHT ELEMENTS OF BIOLOGICAL DIVERSITY

ECOLOGICAL PROCESSES
↓
PLANT ASSOCIATIONS AND COMMUNITIES
↓
TOTAL NUMBER OF PLANT & VERTEBRATE SPECIES
↓
SPECIES EXTINCTIONS AND INTRODUCTIONS
↓
SPECIES ABUNDANCE & DISTRIBUTIONS
↓
MANAGEMENT INDICATOR SPECIES
↓
HABITAT FRAGMENTATION
↓
SPECIES VULNERABILITY

Ecological Processes

Ecological processes create the environmental conditions which shape plant and animal communities present in a National Forest. Significant ecological processes on the Tongass National Forest include:

1) *The amount and pattern of rainfall.* (See Analysis of the Management Situation, Tongass National Forest, 1990, pp. 3-537 - 3-558).

2) *The effects of glaciation and time of recession of glaciers.* The distribution and age of the natural vegetational communities is the result of glacial advances and recession. The distribution of animal species among the islands and the mainland is also attributed to the effect of glaciers (Klein 1965).

3) *The lack of natural fire.* Fire has not been a major factor in shaping the vegetative conditions on the Tongass (see Analysis of the Management Situation, Tongass National Forest, 1990, pp. 3-67 - 3-73).

4) *The influence of wind.* Wind has been a widespread natural disturbance factor shaping forested vegetation on the Tongass. Wind effects can be placed in two categories: a) Wind is a constant "small scale" disturbance force throughout most of the Forest, wherein

individual trees or small groups of trees are blown over, which creates small openings in forest stands. b) Wind is a "large scale" disturbance force at specific times and places, wherein large blocks of trees (hundreds of acres in size) can be blown down in violent localized wind storms.

5) *Physical characteristics of Southeast Alaska that combine with ecological processes to create unique environments*. These include steepness of slopes, presence of high water tables, soil types and conditions, and elevations.

These ecological processes are not independent processes, but rather combine to create the environmental conditions which are the Tongass National Forest. The discussions on the physical and biological setting at the beginning of this chapter help illustrate these conditions.

Most of the forest area on the Tongass National Forest is old growth, particularly on islands which were uncovered before the mainland during the most recent glacial recession. These islands provide important habitat for plants and animals, yet rarely in any archipelago are populations of all species found on all islands. Biogeographic factors, including island size and distance to other islands and the mainland, influence the ability of a species to successfully colonize islands (MacArthur and Wilson 1967). Factors associated with behavior and ecological relationships are also thought to influence distribution of animal species. Examples of this are Admiralty, Baranof, and Chichagof Islands which support brown bear but not black bear (*Ursus americanus*) populations. Some islands have populations of gray wolves, while others do not, and their presence has an important influence on the distribution and abundance of other species such as Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) {Van Ballenberghe and Hanley 1984}.

Plant Associations

The types of plant communities and plant associations present in an area are the result of the ecological processes. The ecological processes in place in Southeast Alaska have created conifer forests which are ecologically unique in North America. These forests have been classified into one ecological type, seven series, and 57 plant associations (Table 3-2) (Martin 1989).

Plant associations have been developed only for the conifer forests on the Tongass National Forest and not for other vegetational communities such as cottonwood, muskegs, and shrubs. At the present time, it is not possible to accurately calculate the total acres of each of the Forest's plant associations because soils mapping has not been completed for several Wilderness areas.

TABLE 3-2
PLANT ASSOCIATIONS AND THEIR DISTRIBUTION ON THE THREE TONGASS ADMINISTRATIVE AREAS.

			Distribution by Administrative Area		
Series	*Plant Association Number and Common Name*		*Chatham*	*Ketchikan*	*Stikine*
Western Hemlock	110	Western Hemlock/Blueberry	X	X	X
	120	Western Hemlock/Blueberry/Spinulose Shield Fern	X	X	X
	130	Western Hemlock/Blueberry/Skunk Cabbage	X	X	X
	140	Western Hemlock/Blueberry-Devil's Club	X	X	X
	150	Western Hemlock/Blueberry-Devil's Club-Shallow Soils	X	-	-
	155	Western Hemlock/Devil's Club-Salmonberry	-	-	X
	160	Western Hemlock/Devil's Club	X	X	-
	170	Western Hemlock/Devil's Club/Skunk Cabbage	X	-	-
Western Hemlock-Alaska Cedar (WH-AC)	210	WH-AC/Blueberry	X	X	X
	220	WH-AC/Blueberry/Skunk Cabbage	X	X	X
	230	WH-AC/Blueberry-Rusty Menziesia	X	-	-
	250	WH-AC/Blueberry-Devil's Club	X	X	-
Sitka Spruce	310	Sitka Spruce/Blueberry	X	X	X
	320	Sitka Spruce/Blueberry-Devil's Club	X	X	X
	330	Sitka Spruce/Devil's Club	X	X	X
	335	Sitka Spruce/Devil's Club-Salmonberry	X	X	-
	340	Sitka Spruce/Devil's Club/Skunk Cabbage	X	X	X
	345	Sitka Spruce/Devil's Club-Upland	X	-	-
	350	Sitka Spruce/Alder	X	X	X
	351	Sitka Spruce/Alder-Devil's Club	-	X	-
	352	Sitka Spruce/Red Alder	X	X	X
	353	Sitka Spruce/Sitka Alder	X	-	-
	355	Sitka Spruce/Devil's Club/Enchanter's Nightshade	-	-	X
	360	Sitka Spruce/Pacific Reedgrass	X	X	-
	370	Sitka Spruce/Blueberry/Skunk Cabbage	X	X	X
	380	Sitka Spruce/Salmonberry	-	X	-
	395	Sitka Spruce-Mountain Hemlock/Blueberry-Devil's Club	-	-	X
Mixed Conifer	410	Mixed Conifer/Blueberry	X	X	X
	420	Mixed Conifer/Blueberry/Skunk Cabbage	X	X	X
	430	Mixed Conifer/Blueberry/Deer Cabbage	X	X	X
	440	Mixed Conifer/Skunk Cabbage-Lady Fern	X	-	-
	460	Mixed Conifer/Blueberry-Salal	-	X	X
	470	Mixed Conifer/Salal/Skunk Cabbage	-	-	X
	480	Mixed Conifer/Salal	-	X	-
	490	Mixed Conifer/Copperbush	X	-	-

TABLE 3-2 (Continued)
PLANT ASSOCIATIONS AND THEIR DISTRIBUTION ON THE THREE TONGASS ADMINISTRATIVE AREAS.

Series	*Plant Association Number and Common Name*		*Distribution by Administrative Area* *Chatham*	*Ketchikan*	*Stikine*
Mountain Hemlock	510	Mountain Hemlock/Blueberry	X	X	X
	511	Mountain Hemlock-Sitka Spruce/Blueberry	X	-	-
	515	Mountain Hemlock/Blueberry-Low Elevation		X	-
	520	Mountain Hemlock/Copper Bush-Cassiope	X	-	-
	530	Mountain Hemlock/Cassiope	X	X	X
	540	Mountain Hemlock/Blueberry-Copper Bush/Deer Cabbage	-	X	X
	550	Mountain Hemlock-Alaska Cedar/Blueberry	-	X	-
	560	Mountain Hemlock-Alaska Cedar/Blueberry-Copper Bush/Deer Cabbage	-	X	-
	570	Mountain Hemlock/Blueberry/Marsh Marigold	-	-	-
	580	Mountain Hemlock/Blueberry/Skunk Cabbage	-	-	X
	NO #	Mountain Hemlock/Blueberry/Deer Cabbage	X	-	-
Shorepine	610	Shorepine/Crowberry	X	X	X
	620	Shorepine/Blueberry	-	-	X
	630	Shorepine/Tall Sedge	X	-	-
	630	Shorepine/Sitka Sedge	-	-	X
Western Hemlock-Red Cedar (WH-RC)	710	WH-RC/Blueberry	-	X	X
	720	WH-RC/Sword Fern	-	X	-
	730	WH-RC/Blueberry/Skunk Cabbage	-	X	X
	750	WH-RC/Blueberry-Well Drained	-	X	-
	760	WH-RC/Blueberry-Salal	-	X	-
	765	WH-RC/Blueberry-Salal/Skunk Cabbage	-	X	-
	780	WH-RC/Salal	-	X	-

Source: November 16, 1989 Listing of Plant Associations by Jon R. Martin, Tom Demeo, Everett Kissinger, Kitty LaBounty, Bill Pawuk, and Randy West.

Number of Animal and Plant Species

This element of biological diversity is an accounting of all plant and animal species known to occur on the Tongass National Forest. The Tongass National Forest provides habitat for 72 species of mammals, 231 species of birds, and 5 species of amphibians and reptiles (Taylor 1979). Additionally, there are 18 species of marine mammals found in Southeast Alaska which depend entirely on the marine environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and 3 species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor 1979). The Wildlife section of this chapter provides information on these animal species.

Thirty-seven freshwater and anadromous fish species are found in the fresh waters of Southeast Alaska (Taylor 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor 1979). The Fish section of this chapter presents additional information on the fish species on the Tongass National Forest.

Approximately 1,000 vascular plant species occur in Southeast Alaska, with 151 of these species being introduced since Russian contact (Muller 1983). These species can be grouped into five life forms: 1) *Pteridophytes* - which includes species of ferns, horsetails, club mosses and quillworts; 2) *Graminoids* - which includes species of grasses, sedges and rushes; 3) *Forbs* - includes plant species which die back each year and are not woody; 4) *Shrubs* - low woody perennial plants (usually under 10 feet) frequently with multiple stems; 5) *Trees* - tall woody plants (usually over 10 feet), generally with one main trunk. Table 3-3 summarizes the number of vascular plant species present in Southeast Alaska by each of the life forms.

TABLE 3-3
NUMBER OF VASCULAR PLANT SPECIES IN SOUTHEAST ALASKA BY LIFEFORM GROUP

	Pteridophytes	*Graminoids*	*Forb*	*Shrubs*	*Trees*
Native Species	52	186	510	93	21
Introduced Species	0	31	116	2	2

Source: Muller, M. 1983. A Preliminary Check list of the Vascular Plants in Southeastern Alaska. USDA Forest Service, Admin. Doc. Number 112.

With our current state of knowledge, four plant species have been identified as possible endemics to Southeast Alaska. (In this instance, endemics are plants only found in Southeast Alaska and no other place in the world.) All four species have questionable taxonomic status, and further field study and investigation are necessary to establish the validity of these species. A summary of these four species follows:

Castilleja chrymactis: Beach meadows habitat; possible endemic to northern Southeast Alaska; taxonomic questions need to be resolved.

Habenaria gracilis: Wet meadows habitat; known only from extreme southern Southeast Alaska and adjacent British Columbia; some authors place this species with *H. saccata*; taxonomic questions need to be resolved.

Poa merrilliana: Known only from Hubbard Glacier area; probably should be placed with *P. leptocoma*; further field and taxonomic study necessary to determine status.

Poa norbergii: Known only from Hoonah area; probably should be placed with *P. macrocalyx*; further field and taxonomic study necessary to determine status.

Species Extinctions & Introductions

The great auk (a flightless bird) and the Steller's sea cows are extinct on the Tongass National Forest due to overharvest during Russian ownership of Southeast Alaska in the mid-1800's (Ray 1988). Marten, red squirrel, and mountain goat were introduced on many of the islands; previously they existed only on the mainland (Burris and McKnight 1973). Elk, which are not native to Southeast Alaska, have recently been introduced on Etolin Island; a small number of elk have naturally dispersed from Etolin Island to Zarembo Island. The Wildlife section contains additional information on the current distribution of marten, red squirrel, and mountain goat.

Brook trout and arctic grayling, which are not native to Southeast Alaska, have been introduced into several lakes and streams. Stocking of many lakes in Southeast Alaska with brook trout occurred from about 1916 until the late 1950's. Most of these stockings failed. Presently, 17 lakes throughout Southeast Alaska are known to contain brook trout (Schwan et al. 1984). Arctic grayling were stocked in lakes commencing in 1950 and continuing after statehood. The success of these stockings has varied from complete failure to excellent. Currently, 17 lakes are known to contain reproducing populations of grayling (Schwan et al. 1984).

Some fish stocking efforts have used fish from areas outside of Southeast Alaska, and although new species have not been introduced, new genetic fish stocks have.

Species Abundance & Distribution

The National Forest Management Act provides direction to maintain viable populations of vertebrates that are well distributed throughout the planning area (USDA Forest Service, 1982). To accomplish this direction, historical and current distributions and abundance of species must be understood and discussed. Discussion of all 356 animal and 1,000 plant species found on the Tongass National Forest is not possible nor are data available to discuss each species. Rather, the emphasis is placed on those species identified by the public or within the agency as being of special concern. Such species include endemics, threatened, endangered and sensitive species, and species receiving emphasis for management.

Management Indicator Species

Population changes of Management Indicator Species (MIS) are believed to reflect the effects of land management activities. Evaluation of all species occurring within a planning area can be reduced through this concept to a number that promotes meaningful evaluation. The evaluation of the effects of management practices on MIS and their habitats provides an additional basis for ensuring the maintenance of biological diversity.

Eight mammals, five birds, and three fish species were selected as Management Indicator Species for the Tongass National Forest from 29 proposed species (Sidle and Suring 1986). Information on the habitat relationships of MIS is incorporated in Forest planning through the application of habitat suitability and habitat capability models. Such models are used to project the response of MIS to changes in habitat quality and diversity.

The Fish and Wildlife sections of this chapter display the habitat capability of the Tongass National Forest for each of the Management Indicator Species.

Habitat Fragmentation

Fragmentation is an element of biological diversity that describes the natural condition of habitats in terms of old-growth patch size and distribution, and the effects of management on this patch size and distribution. Discussions of fragmentation illustrate the effect of management activities on the quantity, size and distribution of habitats. Emphasis is placed on the Management Indicator Species, threatened, endangered and sensitive species, and endemic and other species' habitats identified by the public or interagency committees.

Response of Species to Environment

Three concepts were developed which describe how species generally use or respond to their environment with regard to minimum old-growth patch size and or corridors. The amount of contiguous habitat, and the extent to which similar habitats connect by corridors, are currently considered key concepts in managing for biological diversity.

Landscape Concept. Wildlife species included under this concept generally have large seasonal or year-long home ranges and territories. These species are capable of using a wide variety of vegetative conditions, although

preferences for certain vegetation types exist which provide a higher quantity or quality of forage or cover needs. Usually there is not just one critical or limiting season which has been identified for the species. Species will travel or move through a wide variety of habitats to use their environment, therefore, specific corridor requirements are not needed. These species do not have a minimum old-growth patch size requirement to use a particular habitat. Managing or maintaining preferred or higher quality vegetation types will result in higher populations than managing or maintaining less preferred or lower quality vegetation types. Managing to minimize "population sinks" will increase habitat effectiveness and is an important management priority. "Population sinks" are factors such as roads and human disturbance which directly affect a population either through displacement of individuals from preferred habitats or through mortality (Knight et al. 1988).

Community Concept. Wildlife species generally have smaller home ranges and territories than in the landscape concept. Sometimes a particular season of the year is considered a critical or limiting season which greatly influences the overall population of a species. These species show a high preference or requirement for a particular vegetative community or combination of communities, especially during the season of the year which is considered critical. Preferred or required habitats may need to be within the mean dispersal distance of the species and corridors may be needed. These species generally show a relationship with patch size of the preferred or required habitats. In some situations, as patch sizes are reduced, a species may be displaced by another species which can more effectively use the habitat. Management concerns for these species include maintaining proper dispersal of habitats and effective corridors between habitats, where required.

Structural Concept. Wildlife species in this category require a specific or unique habitat element or site for their presence, such as a pond or cliff for nesting. Often, the size, location, and abundance of these sites are the result of natural geologic or climatic events rather than the effects of management. Management concerns for these species include: (1) maintaining the integrity of the site, (2) preventing human disturbances which would cause the species to abandon the site, and (3) understanding and managing for natural disturbances (such as blowdown) which can affect the site.

Each of the MIS (except fish) and proposed sensitive species (except fish) selected for the Tongass National Forest was placed within one of the above concepts (Table 3-4). For the species within the landscape and structural concepts, the habitat capability models and or management direction indicate habitat relationships and management opportunities. Specific patch size relationships and corridors are not applicable to these species. Species within the community concept are thought to be sensitive to minimum-sized patches of habitat and, in most cases, corridors. As old-growth patch size decreases,

the value of the habitat decreases. When patches fall below the minimum size, they no longer provide habitat for the species. Guidelines for corridors include definition of plant communities' suitability to serve as corridors for each species. The sections titled Wildlife and Threatened, Endangered and Sensitive Species explain the old-growth patch sizes and corridor requirements for each of these species.

Habitat fragmentation is a concern primarily associated with timber harvesting. Wildlife implications of roaded and unroaded areas are discussed under Wildlife. Most of the timber harvesting which has occurred on the Forest will be associated with the areas classified as roaded. An analysis of the amount of habitat fragmentation occurring in the roaded areas is not possible with the Revision database. However, this table provides a perspective for the amount of area on the Forest where possible habitat fragmentation has occurred.

TABLE 3-4
MANAGEMENT INDICATOR SPECIES, ENDANGERED, THREATENED, CANDIDATE AND SENSITIVE SPECIES ON THE TONGASS NATIONAL FOREST, BY LANDSCAPE, COMMUNITY AND STRUCTURAL CONCEPTS.

Concept	***Species***
Landscape	Brown bear
	Black bear
	Gray wolf
	River otter
	Mountain goat
	North American lynx
Community	Marten
	Red squirrel
	Red-breasted sapsucker
	Hairy woodpecker
	Brown creeper
	Marbled murrelet
	Vancouver Canada goose
	Glacier Bay water shrew
	Sitka black-tailed deer
Structural	Bald eagle
	Trumpeter swan
	Peregrine falcon
	Osprey

Species Vulnerability

The emphasis in this element is to identify plant and animal species or other unique genetic stocks that may be impacted by environmental events or human activities. These species include threatened and endangered species listed under authority of the Endangered Species Act of 1973, as amended, by the U.S. Fish and Wildlife Service or National Marine Fisheries Service. These species also include those which are identified by State endangered species laws, or species which are identified by the Regional Forester as sensitive species.

There are eight species of whales, and two sub-species of peregrine falcon that are currently listed as Threatened or Endangered under authority of the Endangered Species Act. Six species of plants and three animal species are currently "Category 2 Candidate" species, which means they are being considered for listing as threatened or endangered. Five plant species and three animal species are currently "Category 3b or 3c Candidate" species, which means they are either taxonomically invalid or more abundant, widespread and less subject to identifiable threats than previously thought. Three birds and three fish have been designated by the Regional Forester as sensitive species on the Tongass National Forest. The "Threatened, Endangered, Candidate and Sensitive Species" section of this chapter discusses these species.

BIODIVERSITY

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

This section focuses on the direct, indirect and cumulative effects that each alternative will have on biological diversity on the Tongass National Forest. Where information is presented in other sections of the DEIS which relate to biological diversity, a reference will be made to refer to that section for the information.

Ecological Processes

Some of the natural ecological processes can be altered by resource management activities. Resource development activities such as timber harvesting have the potential to alter ecological processes more than non-development activities such as primitive recreation. Table 3-5 displays the percent of the Forest allocated to four prescription groupings for each of the alternatives. These prescription groupings represent different levels of resource development or non-development activity. Alternative A has 80 percent of the Forest within Wilderness, Recommended Wilderness or Natural Setting prescription groups. Alternative D has 64 percent of the Forest within Wilderness, Recommended Wilderness or Natural Setting prescription groups. The other alternatives fall between 80 and 64 percent. Natural ecological processes will continue without changes due to resource development in the majority of lands under all alternatives.

TABLE 3-5
PERCENT OF TONGASS ACRES ALLOCATED TO FOUR PRESCRIPTION GROUPINGS FOR EACH ALTERNATIVE

			Alternative				
Prescription Group	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Intensive Development	6	13	24	32	20	22	22
Moderate Development	14	11	16	5	13	15	15
Natural Setting	36	43	27	31	23	31	30
Wilderness/Recommended Wilderness	44	33	33	33	44	33	30

Source: Revision Database, March 1990.

Plant Associations

At the present time, it is not possible to accurately calculate the total acres of each of the Forest's plant associations; this is primarily because soils mapping has not been completed in Wilderness Areas. However, information on old-growth forests, and how each alternative affects the amount of old growth remaining on the Forest is presented under Old-Growth Forests.

Number of Animal and Plant Species & Introductions

All alternatives are expected to maintain viable populations of all plant and animal species. There are no plans for introductions of new species. In 1987, elk were introduced into Southeast Alaska on Etolin Island. A few of these elk have naturally dispersed from Etolin Island to Zarembo Island. Management agencies are currently evaluating future management options for elk in Southeast Alaska. Fish enhancement projects include stocking of native species of fish into barren lakes.

Management Indicator Species (MIS)

The Fish and Wildlife sections of Chapter 3 display the environmental consequences of each alternative on the MIS.

Habitat Fragmentation

The alteration of natural patch sizes is an issue associated with areas of land which have been allocated to management prescriptions that may schedule timber harvesting. Natural old-growth patch sizes would be maintained with those areas of land allocated to management prescriptions where timber harvest is not allowed. Table 3-6 displays the amount of productive old growth within both groups of management prescriptions for each alternative. Alternative A has 73 percent of the existing productive old growth in areas with no timber harvest; Alternative B has 67 percent; Alternative C has 46 percent; Alternative D has 50 percent; Alternative E has 56 percent; Alternative F has 50 percent; and Alternative G has 49 percent.

TABLE 3-6
ACRES OF PRODUCTIVE OLD GROWTH ALLOCATED TO TWO GROUPS OF MANAGEMENT PRESCRIPTIONS (RX's), AND OLD GROWTH ACRES ESTIMATED TO BE HARVESTED BY 2150.

	Alternatives						
	A	*B*	*C*	*D*	*E*	*F*	*G*
	Acres in millions						
Prod. Old Growth in No Harvest Rx's	3.757	3.456	2.371	2.601	2.878	2.594	2.523
Prod. Old Growth in Harvest Rx's	1.276	1.719	2.804	2.474	2.288	2.582	2.688
Prod. Old Growth to be Harvested	0.440	0.936	1.046	1.266	0.606	0.936	0.936

Also displayed in Table 3-6 is the estimated amount of old growth acres to be harvested within those areas of land allocated to management prescriptions with scheduled timber harvesting. Not all of the productive old growth is scheduled to be harvested even in the areas of land allocated to management prescriptions which allow timber harvesting. Within the areas of land which allow timber harvesting, Alternative A has 66 percent of the productive old growth unharvested;

Alternative B has 46 percent unharvested; Alternative C has 63 percent unharvested; Alternative D has 49 percent unharvested; Alternative E has 79 percent unharvested; Alternative F has 64 percent unharvested; and Alternative G has 65 percent unharvested.

Thus, of the approximately 5.2 million acres of productive old growth, the actual amount to be harvested over the next 150 years ranges from 0.44 million acres (8 percent) in Alternative A to 1.27 million acres (24 percent) in Alternative D. What this means for biological diversity depends largely on the distribution and size of harvest units.

Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is done at the site-specific project level. Forest-wide Standards & Guidelines direct project level analysis to use the old-growth patch size relationships for the MIS.

Species Vulnerability

These species include threatened and endangered species listed under authority of the Endangered Species Act of 1973, as amended, by the U.S. Fish and Wildlife Service or National Marine Fisheries Service. These species also include those which are identified by State endangered species laws, or species which are identified by the Regional Forester as sensitive species. The Threatened, Endangered, Candidate and Sensitive Species section of Chapter 3 discusses these species in detail.

CULTURAL AND HISTORICAL

AFFECTED ENVIRONMENT

Cultural resources located in the Tongass National Forest include a diverse range of prehistoric and historic sites and artifacts that span approximately 10,000 years of human occupation and resource use. Prehistoric remains include campsites, village sites, graves, resource areas, rock art, portages, and rock shelters. Historic sites include houses, cabins, mines, quarries, trails, portages, tramways, salteries, canneries, boatworks, boats, shipwrecks, military installations and Civilian Conservation Corps trails, shelters, camps, campgrounds, and buildings.

Many of these cultural remains provide the only record of former human occupation, work areas, and lifestyles. Some of these sites may represent cultural traditions associated with early human migration into Alaska, and others may be significant for European exploration and historic economic development. Additionally some areas may have traditional or spiritual significance for contemporary Native Americans. The recovery of information from these sites and objects is important in reconstructing previous human behavior and adaptation in response to environmental or social change. Cultural resources located on the Tongass National Forest represent an important part of our local, regional, and national cultural heritage.

Relatively high densities of undiscovered cultural resources are expected to be located within the Forest in the future. Between 1976 and 1986, approximately 68,000 acres of National Forest Lands were inventoried for cultural resources. Approximately 2,098 cultural resource sites have been identified, of which 983 sites have been field verified, 36 sites determined eligible and 5 sites listed on the National Register of Historic Places. One site, Fort Durham, achieved National Historic Landmark status (Cultural Resource Overview, 1987; Alaska Heritage Resource Survey, 1989). To date, all previous surface inspections account for less than one percent of Tongass National Forest acreage. Information gathered from these inventory efforts will provide information about resource distribution, sensitivity to damage and allocation of the resource.

Certain types of cultural resources such as sites, artifacts, and other observable results of human activity have a greater probability of being located in specific areas, including intertidal zones, beach fringes, riparian zones, areas of known mineral deposits, areas of other known resources, and uplifted fossil beaches. These generalized locations are also influenced by other environmental variables, such as as slope, aspect, and elevation. The environmental characteristics that invited human use and habitation in prehistoric times are often the same factors which invite use today.

However, because of elevational and sea level changes after deglaciation, the location of the earliest human activity areas may be further inland and at higher elevations than more recent human activity areas. Some significant resource activity areas may occur at any elevation such as those associated with hunting and trapping, historic mining, and international boundary survey remains. Specific locations associated with Native American traditional and religious use are identified in an on-going basis.

CULTURAL AND HISTORICAL

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

The preservation and protection of the Forest's cultural resources are both closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics where management activities occur. Impacts to the resource may occur from natural forces, from public access or project-related activities.

Erosion and other environmental effects may deteriorate cultural resource sites through decomposition. This kind of resource damage is most evident in objects or structures made of wood. Stabilization, regular maintenance, rehabilitation or data recovery are means to prevent the loss of the sites and the information that they contain.

Public use may destroy cultural resource sites through inadvertent damage caused by compaction, or other ground disturbing activities. Vandalism, including relic collecting, defacement, and theft results in the loss of information and destruction of the resource. Protection of significant cultural resource sites from public use includes the establishment of public education programs, maintaining confidentiality about specific site locations, monitoring, and directing public use away from the most vulnerable sites.

Areas managed for recreation provide opportunities for protection and interpretation for the public education and enjoyment. Active educational and interpretive programs may create a greater awareness of the importance of cultural resources to our heritage and foster a sense of stewardship while adding to the recreational experience. However, protective measures to control or eliminate intentional destruction of these areas by relic collecting and other forms of vandalism must be implemented.

Multiple-use activities have benefited cultural resources by providing opportunities for inventory, evaluation and interpretation in remote areas of the Forest. Ground disturbing activities have the most potential to adversely affect cultural resources and their environmental settings. The amount of impact is determined largely by the location and nature of the activity, the characteristics of the soils, and the degree of use.

Cultural resource management may increase the cost of project implementation. Some areas may need to be avoided entirely in order to protect the cultural resource. This may result in greater expense in accessing sites and a loss of commercial products, such as timber or minerals. Protection of significant cultural resources often precludes the harvest of timber or mining activities within a

designated site boundary. When preservation in place is not desired, or possible, costs may increase due to project delays for required mitigation. Normally, when the Section 106 process of the National Historic Preservation Act is completed early in the planning process, project delay or additional costs is minimal.

In all alternatives, the preferred management of sites eligible for, nominated to, or listed in the National Register of Historic Places shall be avoidance and protection. Potential effects from environmental modification may require mitigation to achieve an effect that is considered to be not adverse in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. These potential effects are diminished when the physical settings around significant cultural resources are maintained in a natural state.

Land allocations (management prescriptions) having a high potential for major environmental modifications include Timber Production (TM) and Minerals (MM). These allocations are most likely to affect significant cultural resources through alteration of environmental settings and the constraints imposed upon future management options. In many instances, retention of a natural environment is crucial to imparting and protecting the values which qualify a cultural resource for National Register status. Opportunity for the identification of new sites is greatest within these areas because of the intensity of inventory efforts. Direct impacts may occur to sites that are determined to be ineligible for the National Register of Historic Places.

Land allocations (management prescriptions) having a moderate potential for environmental modifications include Experimental Forests (EF), Scenic Viewshed (SV), Visual-Timber (VT), and Roaded Natural/Rural Recreation (RN). These allocations are most likely to have a moderate impact on significant cultural resources through alteration of the environmental setting and constraints imposed upon future management options. Opportunity for locating new sites is high because of the intensity of inventory efforts. Future management options will vary and are likely to include increased demand for scientific study and use for interpretation and public enjoyment. Direct impacts may occur to sites that are determined to be ineligible for the National Register of Historic Places.

Land allocations (management prescriptions) having a low potential for environmental modifications include Recommended Wilderness (RW), Wilderness (WW), Wilderness National Monument (WM), Nonwilderness National Monument (NM), Research Natural Area (RA), Beach Fringe and Estuary (BF), Primitive Recreation (PR), Enacted Municipal Watersheds (MW), Old-Growth Habitat (OG), Semi-Primitive Recreation (SP). These allocations are most likely to have a low impact on significant sites through alteration of the environmental setting and constraints imposed upon future management options. The emphasis for inventory to locate new sites will be diminished and management options will

vary with Forest management constraints within those areas. Inventory and protection of cultural resources in these areas are subject to the same cultural resource management requirements as other areas of the Forest, however, inventory may be limited to project specific activities.

An indirect effect common to all alternatives and prescriptions is that the discovery of new sites can lead to vandalism if the locations become known to the public. No cumulative effects are anticipated under any alternative.

EFFECTS OF ALTERNATIVES

Potential effects to cultural resources and the differences between some alternatives are difficult to measure. The difference in effects depends upon the intensity and amount of ground disturbing activity. The amount of potential risk and the intensity of ground disturbance by alternative are displayed in Table 3-7 and Table 3-8.

TABLE 3-7
ACRES OF POTENTIAL RISK TO CULTURAL RESOURCES

	Prescription Group		
Alternative	*Wilderness and Natural Setting*	*Moderate Development*	*Intensive Development*
A	13,613,000	2,292,000	1,097,000
B	12,964,000	1,776,000	2,262,000
C	10,575,000	2,428,000	3,999,000
D	11,144,000	518,000	5,340,000
E	11,693,000	1,945,000	3,364,000
F	11,109,000	2,214,000	3,679,000
G	11,013,000	2,197,000	3,792,000

TABLE 3-8
AMOUNT OF GROUND DISTURBING ACTIVITIES PER YEAR

Alternative	*Road Construction (Miles)*	*Timber Harvest (Million Board Feet)*
A	80	181
B	223	354
C	234	450
D	293	550
E	129	280
F	206	389
G	207	390

Alternative A land allocations involve low to moderate alteration of the landscape, and represent a reduced level of ground disturbance from the current situation. Corresponding impact to cultural resources is expected to be low to moderate. Discovery and protection opportunities may be limited from a reduced inventory effort as compared to other alternative.

Alternative B land allocations involve moderate alteration of the landscape, and represent a moderate level of ground disturbance from the current situation. Corresponding impact to cultural resources is expected to be moderate.

Alternative C land allocations involve maintaining current direction and program activities. Little change is expected in timber harvest levels, road construction activities or other commodity oriented projects which represents a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Alternative D land allocations involve increased levels of timber harvest and road building activities which represents a high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Alternative E land allocations involve a slight decrease in timber harvest levels, road construction activities and other commodity oriented projects which represents a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Alternative F land allocations involve little change in timber harvest levels, road construction activities or other commodity oriented projects which represents a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Alternative G land allocations involve little change in timber harvest levels, road construction activities or other commodity oriented projects which represents a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

MITIGATION

All alternatives include requirements for inventory, protection, preservation, interpretation and consultation with the State Historic Preservation Office as described in the standards and guidelines. This compliance review process considers cumulative effects to cultural resources by any proposed action on

National Forest Lands. Effects are avoided or mitigated through a variety of measures. Mitigation of adverse effects will result in the collection of information. The cumulative effect of data collection will result in an increase in knowledge of previous human settlement patterns and cultural development.

Mitigation of potential effects to cultural resources other than avoidance may include protective enclosures, systematic monitoring of project activities, or mandatory restrictions on project design. When impacts cannot be avoided, systematic recovery of the information through excavation, collection of materials, and detailed documentation may be required as determined through consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

An Alaskan State Comprehensive Historic Preservation Plan is being compiled by the Office of History and Archaeology. When completed, this plan will provide additional information and direction for consideration of evaluating and developing cultural resource management strategies.

EXPERIMENTAL FORESTS

AFFECTED ENVIRONMENT

Experimental forests provide lands for conducting research that serves as a basis for forest management. Experimental forests provide areas for "manipulative" research, wherein the natural resources are designed to be used or altered under controlled scientific studies.

EXISTING EXPERIMENTAL FORESTS

Two experimental forests currently exist within the Tongass National Forest: Young Bay and Maybeso (see map packet, Alternative C for locations).

Young Bay. The Young Bay Experimental Forest is located just south of Juneau on northern Admiralty Island. Originally selected for long-term hydrologic and fisheries monitoring with a paired comparison between streams, this site was used extensively for fisheries and hydrology research in the 1960's and 1970's, including the construction of artificial stream channels, labs, housing for field personnel, and installation of permanent weather monitoring stations.

Located mostly on steep north-facing slopes underlain by shallow soils derived from colluvium and weathered glacial till, this experimental forest has an extensive terrace or bench underlain by poorly-drained marine silt (the Gastineau Formation) which extends across the lower slopes between sea level and 100 feet in elevation. As a result this part of the forest, being open and relatively unproductive, is atypical of those normally managed for timber production in Southeast Alaska. Little forest vegetation type-diversity is present making Young Bay's use for other studies difficult. Due to high winds, access during the winter is often challenging.

Maybeso. Established in the early 1950's as a part of an intensive research program to document the effects of large-scale clearcutting on hydrology, fisheries, and timber productivity, the Maybeso Experimental Forest is located on a large steep-sided alluvial valley with a south to southeast-facing aspect near the central-eastern coast of Prince of Wales Island in southern Southeast Alaska. By the early 1960's most of the experimental area had been clearcut. Permanent research plots were established and monitored to study hillslope erosion, movement of large woody debris in and into streams, forest regeneration, and silvicultural responses to precommercial thinning. Most of these plots are still being monitored.

Since nearly all of the commercial timber on the Maybeso Experimental Forest has been harvested, there are limited opportunities to design new experiments on anything but very young second growth. Only a limited variety of vegetation

and timber types are available within the area. Research completed here is of limited applicability to other areas of the Forest.

EXPERIMENTAL FOREST PROPOSALS

Current experimental forest needs include: 1) the ability to do long-term monitoring and manipulative experiments for demonstration purposes and basic research; and 2) the ability to carefully control and monitor the nature and timing of experimental treatments. Research work in experimental forests is not a substitute for research now being done cooperatively throughout the Forest, but an important supplement to it. No single location will meet all criteria, therefore, more than two experimental forests may be necessary.

To be considered, new experimental forests must represent a wide range of forest and vegetation types that span the full range of typical occurrences within intensively managed drainages on the Tongass. Large variations in slope, aspect, soil drainage and parent materials should be important elements of this ecosystem diversity. Examples of island versus mainland and northern versus southern panhandle are most desirable.

Experimental Forests should possess enough resource diversity to allow a wide range of research projects across a large number of disciplines. Areas should contain high, or at least diverse, salmonid populations, riparian zones, and stream sizes and types, as well as a reasonable population or at least the habitat for some of the dominant wildlife species such as Sitka black-tailed deer, brown bear, mountain goats, and furbearers. Desirable forest characteristics including a wide range in forest productivity, species composition, and stand structure for silvicultural experiments.

Although accessibility can be a problem in terms of vandalism and unauthorized use of facilities, new experimental forests should be easily accessible year-round. Many research projects involve fall or winter field work. Access during these seasons should be a consideration.

Following is a list of recommended sites for experimental forest designation. These recommendations were developed by the USDA Forest Service - Forestry Sciences Lab (FSL) in Juneau (letters dated March 3, 1988, August 15, 1988, and February 22, 1990). Sites were recommended to fulfill the needs and criteria for experimental forests discussed above.

Shaheen Creek Watershed. Located along the west coast of central Prince of Wales Island, Thorne Bay Ranger District (13,785 acres). For several years, the fisheries and watershed groups at FSL and cooperators at other Forest Service research labs have used the Shaheen watershed and nearby areas. Areas previously impacted by land management are readily accessible for experimental purposes. Good road access is available.

Trap Bay Watershed. Located in Tenakee Inlet, Sitka Ranger District (3,797 acres). For several years, the Trap Bay watershed has been a research site used by the Forestry Sciences Lab, university cooperators, Alaska Department of Fish and Game and National Marine Fisheries Service. The watershed, fisheries, and timber groups of FSL and university cooperators are currently conducting active research programs at the site. FSL and National Marine Fisheries Service have well maintained cabins and storage buildings. Ferry and aircraft service is available to nearby Tenakee Springs, facilitating logistics and response to emergencies.

Staney Creek Watershed. Located on northwest Prince of Wales Island, Thorne Bay Ranger District (41,285 acres). This watershed as well as nearby areas have been used for research by the fisheries and watershed groups at Forest Sciences Lab, and by cooperators at other Forest Service research labs for several years. Areas previously impacted by land management are readily accessible for experimental purposes. Good road access is available.

Chicken Creek Watershed. Located on northern Chichagof Island, Hoonah Ranger District (15,582 acres). Good ecosystem diversity, highly varied physiography, a well developed stream system and range of channel types are characteristic of the Chicken Creek watershed. Access to this area would be very expensive, thus a limitation for its development as an experimental forest.

EXPERIMENTAL FORESTS

ENVIRONMENTAL CONSEQUENCES

This section focuses on the effect that each alternative will have on the four proposed experimental forests. Designation of an area as an experimental forest provides the opportunity to conduct "manipulative" research, wherein the natural resources are designed to be used or altered under controlled scientific studies.

DIRECT AND INDIRECT EFFECTS

Table 3-9 displays which of the new experimental forest proposals are recommended for establishment or some other form of management in each alternative. Alternative A recommends establishment of portions of two experimental forest proposals; Alternative B recommends establishment of two experimental forest proposals; Alternatives C, D, E, F, and G do not have recommendations for new experimental forests.

TABLE 3-9
OVERVIEW OF HOW THE PROPOSED EXPERIMENTAL FOREST WATERSHEDS ARE ALLOCATED IN EACH ALTERNATIVE.

				Alternatives			
Experimental Forest Proposals	*A*	*B*	*C*	*D*	*E*	*F*	*G*
				Prescription Grouping [1]			
Shaheen Creek Watershed	M/R*	R	I	I	I	I	I
Trap Bay Watershed	W	N	I	I/N	W	N	N
Staney Creek Watershed	M/R*	R	I	I	I	I	I
Chicken Creek Watershed	W	N	I	I/N	W	I	I

[1]R = recommended for experimental forest designation.
R* = original proposals have been reduced in size, and additional review will be needed to see if the reduced size provides the necessary attributes sought for in experimental forests.
I = intensive development prescription group
M = moderate development prescription group
N = natural setting prescription group
W = wilderness or recommended wilderness prescription group

Shaheen Creek Watershed. With Alternative A, portions of the Shaheen Creek Watershed are allocated to moderate development activities, and a portion to experimental forest. Additional study and review will be needed to see if this will provide the experimental forest attributes originally sought in the Shaheen Creek watershed.

With Alternative B, the entire Shaheen Creek watershed is allocated to experimental forest status.

Alternatives C, D, E, F, and G allocate the Shaheen Creek watershed to the intensive development prescription group which could reduce opportunities for future experimental forest designation.

Trap Bay Watershed. Alternatives A and E allocate the Trap Bay watershed to recommended Wilderness, which would not allow manipulative research activities needed for experimental forests.

Alternatives B, F, and G allocate the Trap Bay watershed to the Natural Setting group, which would not allow manipulative research activities needed for experimental forests.

With Alternative C, the Trap Bay watershed is allocated to the Intensive Development group. With Alternative D the watershed is allocated to a combination of Intensive Development and Natural Setting groups, which would not allow manipulative research activities needed for experimental forests.

Staney Creek Watershed. With Alternative A, portions of the Staney Creek Watershed are allocated to moderate development activities, and a portion to experimental forest. Additional study and review will be needed to see if this will provide the experimental forest attributes originally sought for in the Stanley Creek watershed.

With Alternative B, the entire Staney Creek watershed is allocated to experimental forest status.

Alternatives C, D, E, F, and G allocate the Staney Creek watershed to the intensive development group which could reduce opportunities for future experimental forest designation.

Chicken Creek Watershed. Alternatives A and E allocate the Chicken Creek watershed to recommended Wilderness, which would not allow manipulative research activities needed for experimental forests.

Alternative B allocates the Chicken Creek watershed to the Natural Setting group, which would not allow manipulative research activities needed for experimental forests.

With Alternatives C, F, and G the Chicken Creek watershed is allocated to the Intensive Development group which could reduce opportunities for future experimental forest designation.

With Alternative D, this watershed is allocated to a combination of Intensive Development and Natural Setting groups.

CUMULATIVE EFFECTS

Over time, potential Experimental Forest areas that are not designated may lose the qualities which qualified them for experimental forest consideration. This will occur primarily where land-altering activities take place. As potential but undesignated areas are changed in this way, the opportunities for manipulative research, wherein the natural resources are designed to be used or altered under controlled scientific studies, will diminish.

FIRE MANAGEMENT

AFFECTED ENVIRONMENT

Due to precipitation often exceeding 100 inches annually in Southeast Alaska, wildfire occurrence on the Tongass National Forest has been low historically. An annual average of 14 fires has been recorded in the National Fire Data Library records over the past 30 years, although the number each year varies considerably (see Table 3-10). Ninety-five percent of these fires were less than nine acres, with most less than one-quarter acre.

Historical Trends

Three types of wildfires, all human-caused, are common to Southeast Alaska: recreation beach fires, other inland or higher elevation recreational fires, and equipment fires. Lightning, which seldom occurs, and is usually accompanied by heavy rain when it does, is not considered to be a threatening factor in Southeast Alaska. Recreational beach fires and higher elevation fires that are left unattended comprise about 92 percent of fire occurrences in Southeast Alaska; unsuppressed, they tend to spread very slowly and burn deeply. If left unsuppressed, these fires may result in some resource losses.

The remaining fires that occur on the Forest are equipment fires: those fires started from any mechanical, contractor, or equipment activities. Commonly associated with heavy concentrations of dead, woody logging debris (slash piles, decks, and slash remaining in the cutting units following logging), these fires tend to be larger than other fires. Equipment fires, because of their potential to grow larger, generally require more fire suppression forces.

Current Situation

There are no fully funded fire personnel on the Tongass National Forest. Fire suppression forces are comprised of permanent and seasonal employees from all disciplines. Their role is to be trained, qualified, equipped, and seasonally prepared to assist in wildfire suppression on the Forest. In addition, Tongass fire suppression forces provide assistance on the Chugach National Forest, to the interior of Alaska, and to other states.

No direction for fire management is included in the current Forest Plan. Since 1985, fire management program emphasis in Alaska has grown. Forest Service employees are better trained and better equipped, and many have had the opportunity to participate in suppression assignments within Alaska and in other states. Prescribed fire programs have emphasized using fire wisely. Contingency plans have been developed to deal with unforeseen problems in prescribed fire use such as weather changes. Examination of the earlier prescribed fire program shortcomings and failures has been used to build a string of recent successes.

TABLE 3-10
TONGASS NATIONAL FOREST WILDFIRE OCCURRENCE SUMMARY: 1958-1988

Year	*Number of Fires by Class* [1]					*Total Fires*	*Total Acres*
	A	*B*	*C*	*D*	*E+*		
1988	5	12	3	-	-	20	112.4
1987	15	3	2	-	-	20	61.0
1986	10	8	-	-	-	18	4.1
1985	12	-	-	-	-	12	2.1
1984	7	-	-	-	-	7	1.0
1983	18	3	-	-	-	21	4.3
1982	23	1	-	-	-	24	3.3
1981	6	4	-	-	-	10	4.6
1980	8	1	1	-	1	11	612.8
1979	14	2	-	-	-	16	3.4
1978	18	4	-	-	-	22	39.8
1977	20	1	-	-	-	21	3.0
1976	9	-	-	-	-	9	1.0
1975	18	-	1	-	-	19	13.8
1974	12	3	-	-	-	15	8.2
1973	10	-	1	-	-	11	22.0
1972	8	-	1	-	-	9	9.1
1971	13	3	1	-	-	17	72.6
1970	5	-	-	-	-	15	--
1969	4	-	-	-	-	4	0.4
1968	22	4	1	1	-	28	136.9
1967	11	4	1	1	-	17	167.6
1966	6	-	-	-	-	6	0.6
1965	16	1	1	-	-	18	28.1
1964	8	-	-	-	-	8	1.0
1963	1	6	2	-	-	9	68.1
1962	3	1	-	-	-	4	1.2
1961	3	-	-	-	-	3	0.2
1960	12	2	1	-	-	15	51.7
1959	5	-	-	-	-	5	1.0
1958	21	3	3	-	2	29	1467.9
Totals	**344** (79%)	**66** (15%)	**19** (4%)	**3** (1%)	**2** (1%)	**435** (100%)	**2904.3**

Average Number of fires per year = 14 Average acres per fire = 6.7

Source: Regional Fire Records Library, Anchorage, Alaska.
[1]Fire Class Legend: A = 0-.25 acres
B = .26-9 acres
C = 10-99 acres
D = 100-299 acres
E = 300-999 acres
F = 1000-4999 acres
G = 5000+ acres

The Tongass National Forest's fire management direction has been to attack and suppress all wildfires as quickly as possible regardless of vegetation type, burning conditions, fuel loading (the amount of fuel per area), or land management objectives. This direction has evolved into one that stresses cost-efficient suppression based on objectives for the appropriate suppression action, and is supported by an Escaped Fire Situation Analysis.

State and private lands lie within or adjacent to National Forest lands. Through cooperative fire protection agreements based on economics and the "closest forces concept," the Forest Service has assumed all initial attack responsibilities for forested lands in Southeast Alaska. This agreement provides suppression personnel, equipment, and support for up to 24 hours at no cost to the benefiting agency. This agreement and other Regional fire direction is contained in the Alaska Interagency Fire Management Plan (May 1988). This Plan is incorporated into the Revised Forest Plan by reference.

Prescribed Fire

In recent years, the prescribed fire program on the Tongass National Forest has increased. Prescribed burning programs use fire as a tool in accomplishing silvicultural and wildlife resource management objectives. However, due to the need for extensive prescribed fire and fire behavior training, growth of these programs has been slow.

Prescribed fire has the potential to play an important role as a tool in managing forest ecosystems, although the use of prescribed fire will continue to be constrained by the cost and difficulty of accessing areas, by smoke management policies, and, to a lesser extent, air quality requirements.

Future Trends

As recreational use of the Tongass grows, so will the incidence of fire within recreational sites. Historically, these fires have caused site-specific damage to confined areas, but are insignificant on a forest-wide basis. This trend is expected to continue with perhaps a slight increase in acreage burned in the future.

The need for prescribed burning or slash treatment will increase over what is currently used on the Tongass if the amount of vegetation management projects, and wildlife habitat improvement projects increase.

Several factors will continue to affect fire management activities on the Tongass National Forest. The greatest impact to the fire management program will be felt if budgets decrease, resulting in a corresponding decrease in the number of personnel with wildfire responsibilities on the Forest. There will be continued emphasis on training and equipping qualified people, and the need to train people from all disciplines for initial attack and suppression assistance will increase. Emphasis on cooperative fire fighting agreements will continue to be very important.

FIRE MANAGEMENT

ENVIRONMENTAL CONSEQUENCES

Fire has not been an important agent of change in Southeast Alaska and is not expected to be in the foreseeable future. This is a result primarily of the precipitation that is characteristic of the Tongass National Forest. However, in some isolated tracts of land scattered throughout the Forest, fire has played a significant role in structuring the residual vegetation.

DIRECT AND INDIRECT EFFECTS

A number of factors play a role in determining the effects of fire on Forest resources, and how large, damaging, and costly a wildfire can become. All wildfires will continue to be suppressed with an emphasis on the "least cost plus resource loss" strategies (see Standards and Guidelines for Fire Management in Appendix G). *Forest fuels* and *fire occurrence* are two aspects of the fire environment sensitive to the management activities proposed by alternatives.

Forest Fuels. Forest fuels consist of vegetative material, living or dead, that can burn during a fire. Although fuels accumulate and decay at natural rates in the Forest ecosystem, the logging slash left after timber harvest and road construction activity accelerates the natural process of accumulation and generates the greatest impact on forest fuels. Limbs, tops, and cull logs hamper reforestation efforts, increase overall forest flammability, and have the potential to generate high intensity fires that are difficult to control.

Because the amount and arrangement of fuels are important variables in the Forest environment, the reduction of fire hazard is balanced with other resource concerns. The presence and distribution of woody debris provides habitat for animals and insects. For example, fallen logs provide critical habitat for some wildlife, particularly marten. Dead and down vegetative material also contributes to nutrient recycling, part of the ecological cycle. To provide shade and organic matter for new seedlings, a specified amount of cull logs and debris are essential after harvest. Research shows that decaying logs promote fungi that aids in decomposition of organic material and subsequent reforestation.

The Tongass does not have an intensive forest fuels management program. Prescribed burning is the fuels treatment method used most often, however, the annual acreage treated is low in comparison to the number of acres harvested annually. This is because the Tongass National Forest can rely on natural re-seeding and growth for the reforestation of most harvested areas, and site treatments (including prescribed burning) are not needed for natural regeneration. In addition to reforestation activities, prescribed burning is used to improve wildlife habitat.

Fire Occurrence. All of the alternatives will provide for the suppression of wildfires to protect Forest resources and the property and lives of adjacent landowners. Fire occurrence can be expected to vary between the alternatives due to the proposed amounts of recreation use, timber harvest and prescribed burning.

Fires in logging slash have the potential to burn with high intensity and severity because timber harvest units generally have large amounts of fuel. Although prescribed fires are conducted under specified conditions with an approved burning plan, slash burns can escape control. Unexpected changes in weather conditions, particularly erratic, strong winds, pose additional risk during the mopup phase of prescribed burning. Escaped prescribed burns can be difficult to control and can cause damage to adjacent timber and reproduction.

The industrial operations used for road construction, timber harvest, and timber improvement increase the risk of starting a fire. Ignition sources are increased as workers operate equipment such as saws, combustion engines, and cable harvest systems. Fires that occur as a result of industrial operations have the potential to cause extensive damage to cut timber, the residual stand, and expensive logging equipment. The prevention of industrial operation fires is a major portion of wildfire prevention under each alternative. The higher levels of timber activity in Alternative D will increase the chances of industrial fires over the current level. Alternative C will maintain the existing situation. Alternatives G, F and B will have slightly lower chances, and Alternative E and A considerably lower chances.

While increase in dispersed recreational use of the Forest will increase the risk of human-caused fires, increased use of the Forest also contributes to early detection and in some cases suppression of small fires by recreational users. Alternative A would be expected to have the highest number of recreation fires, with Alternatives E, F, G, B, C, and D having lower potential, respectively. While fires started from industrial operations have road access associated with the operations, fires started from recreational use often are not in areas with roaded access. Difficulty of access increases the cost of fire suppression.

CUMULATIVE EFFECTS

In the past, fire has not played a significant role in shaping the vegetative structure of the Tongass National Forest. Insignificant effects to the Forest have occurred since implementation of the Tongass Land Management Plan. Effects associated with reasonably foreseeable future activities are expected to be similar to historic patterns.

The use of prescribed fire may result in changes to the vegetative structure of the Forest over time. As the knowledge of the use and effects of prescribed burning increases, so may its use.

MITIGATION

Forest Service timber sale contracts specify the measures, additional personnel and equipment required for the prevention, early detection, and suppression of fires within a project area. Intensified fire prevention contacts also will be used to increase public awareness.

In designated Wilderness, the incidence of natural fire occurrence is extremely low. Summer rainfall and the relative infrequency of electrical storms are the reasons the Tongass National Forest does not have a prescribed natural fire program. Any wildfire start in the designated wilderness areas will be attacked using the suppression response appropriate with the management area prescription.

Certain fire behavior characteristics can be controlled during prescribed burning activities to minimize and avoid adverse effects on resources. Both fire intensity and duration can be controlled to reduce impacts on vegetation and soils. Prescribed burns can be scheduled for periods when fuel moistures are higher, to lessen the amount of heat generated and amount of material consumed by the fire. Low to moderate intensity fires are used to protect the duff layer and maintain soil nutrients. In addition, ignition patterns can be controlled to produce shorter flame lengths and slower spread, thus reducing the damaging effects of heat transfer from the flames. To manage the potential impacts of smoke on air quality, slash burns are scheduled for times when conditions permit dispersion away from smoke-sensitive areas. Aggressive mop up activity will reduce the duration of the smouldering phase of a fire.

FISH

AFFECTED ENVIRONMENT

Fish and the aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall, streams with glacial origins, and watersheds with high stream densities provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high quality water, is a focal point of public, State and Federal natural resource agencies, as well as user groups, Native organizations and individuals.

The Forest includes approximately 42,500 miles of stream, more than any other in the National Forest system. In addition, there are 20,200 lakes and ponds totaling 260,000 acres. Table 3-11 shows the estimated distribution of the lakes and stream miles by category of fish use. Anadromous fish habitat also provides habitat for resident fish, although this is not represented in the table.

TABLE 3-11
STREAMS, LAKES, AND TYPE OF FISH USE

Fish Habitat	*Stream Miles*	*Numbers of Lakes and Ponds*	*Acres Lakes and Pond*
Anadromous	12,200	4,100	55,400
Resident	11,800	4,800	63,700
Non-fish Habitat	18,500	11,300	148,900

Source: Tongass National Forest GIS queries, with adjustments for uninventoried areas.

Fish Species

Thirty-seven freshwater and anadromous fish species are found in the freshwaters of Southeastern Alaska (Taylor, 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. The primary species harvested for sport, subsistence or commercial uses are shown in Table 3-12.

Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor, 1979). Although these are marine dwellers, some may be affected by upland management activities, such as timber-harvest-related log transfer and storage facilities. Species which may be particularly sensitive to upland management include the king crab (*Paralithodes sp.*), dungeness crab (*Cancer magister*), tanner crab (*Chionocoetes bairdi*), and butter clam (*Saxidomus giganteus*).

TABLE 3-12
COMMONLY HARVESTED SPORT, SUBSISTENCE AND COMMERCIAL FISH

	X = common use		
Species[1]	*Sport*	*Subsis-tence*	*Commercial*
Pacific herring (*Clupea harengus pallasi*)	X	X	X
Pink salmon (*Oncorhynchus gorbuscha*)	X	X	X
Chum salmon (*Oncorhynchus keta*)	X	X	X
Coho salmon (*Oncorhynchus kisutch*)	X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	X	X	X
King salmon (*Oncorhynchus tshawytscha*)	X	X	X
Cutthroat trout (*Oncorhynchus clarki*)	X	-	-
Rainbow trout & steelhead (*Oncorhynchus mykiss*)	X	-	-
Dolly Varden char (*Salvelinus malma*)	X	-	-
Eulachon smelt (*Thaleichthys pacificus*)	-	X	-

[1] Alternate names commonly used for the some of the species are: pink/humpback; chum/dog; coho/dog; coho/silver; sockeye/red; king/chinook; eulachon/candlestick.

The Fisheries Resource

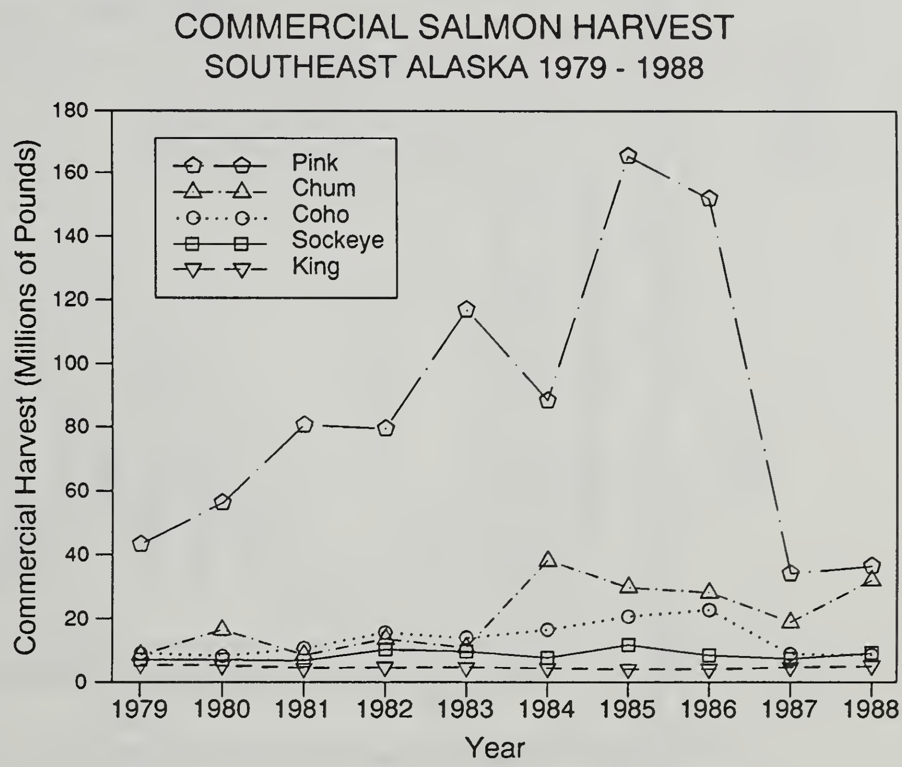
Subsistence and commercially harvested fish provide a way of life and a major source of food for many of the residents of Southeast Alaska. Sportfishing is a favorite activity of Southeast Alaska residents and visitors. Hatcheries and the enhancement of wild fish, among other aquaculture projects, help to supplement natural production. The Alaska Department of Fish and Game is responsible for regulating the amounts of fish harvested.

Subsistence fish harvest is discussed in the Subsistence section of this chapter. Commercial and sport fishing, and fishery projects, are discussed here.

Commercial Fish Harvest. Commercial fish in Southeast Alaska are of two major categories: fish dependent only on marine resources, such as most bottom fish (e.g., cod and halibut) and herring; and those that are dependent on both salt water and fresh water, such as the anadromous salmon and eulachon smelt. Management of National Forest System lands primarily affects the availability of the second group, particularly the anadromous salmon.

Figure 3-3 shows the pounds of commercially harvested salmon during the last ten years (Alaska Department of Fish and Game, 1989). The figure indicates that there are large annual harvest fluctuations, and that pink salmon is the most harvested, followed by chum, coho, sockeye and king salmon.

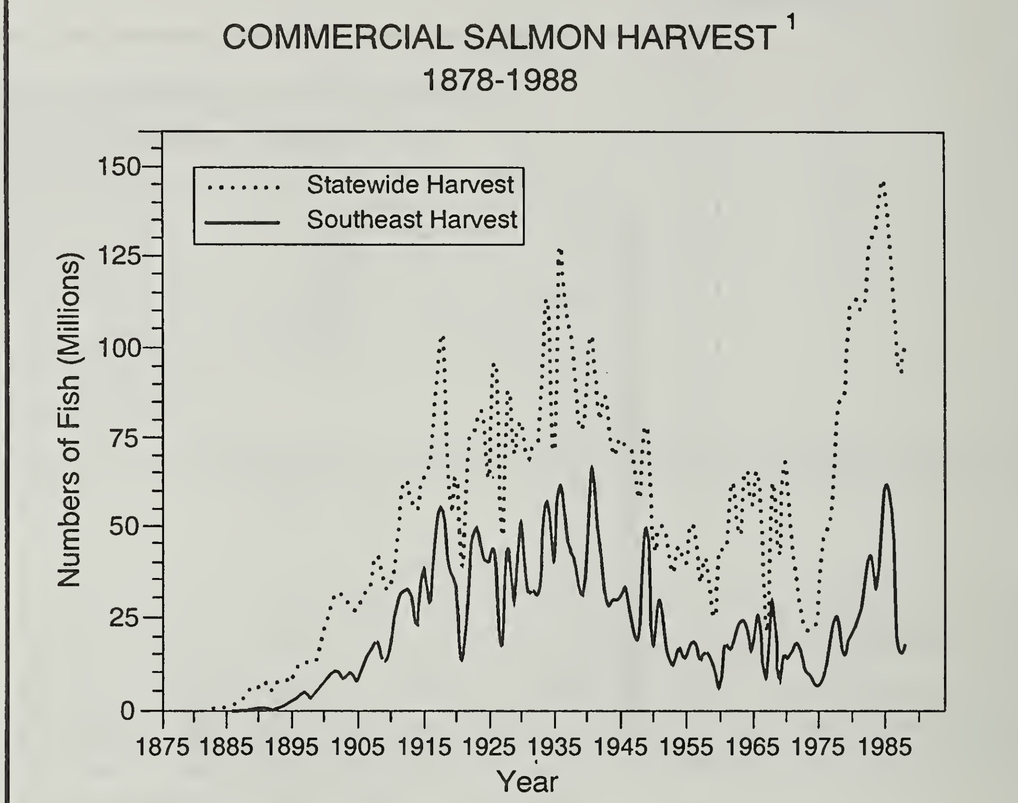
FIGURE 3-3



Source: Alaska Department of Fish and Game: Catch and Production Reports; 1989

To place the last ten years of harvest into long-term perspective, Figure 3-4 shows harvests Statewide and in Southeast Alaska since 1878 (Alaska Department of Fish and Game, 1989). Southeast Alaska harvest of salmon peaked in approximately 1935-1940 at 50 million fish, followed by a steady decline to less than 20 million fish in about 1950. Harvests were generally very low from 1950-1975 with a record recent low of under 6 million fish in 1975. Since 1975, there has been an increased harvest trend, including the setting of a near record in Southeast of approximately 60 million fish in 1985. Preliminary information shows that 1989 harvests have been an all time record high.

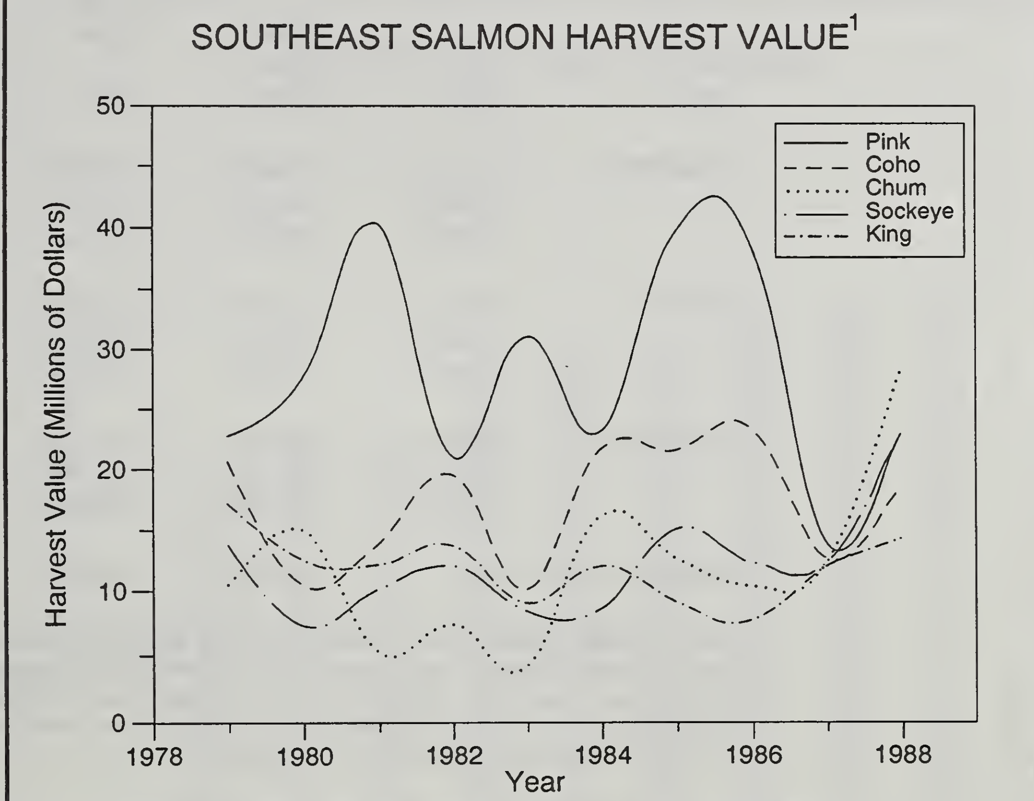
FIGURE 3-4



Source: Alaska Department of Fish and Game, 1989
[1] Data are curve fitted

The value of the commercial harvest has varied, similar to the variations in harvest. Figure 3-5 shows the value of commercial salmon harvest by species during the past 10 years.

FIGURE 3-5



Source: Alaska Department of Fish and Game: Alaska Catch and Production Reports
[1]Data are curve fitted

Sport Fishing. Approximately 18 percent of the sport fishing in the State of Alaska occurs in Southeast Alaska. Of this, approximately 85 percent occurs in the vicinity of the Tongass National Forest (calculated from Mills, 1987).

Table 3-13 shows the number and type of fish sport harvested in the vicinity of the Tongass's three Administrative Areas.

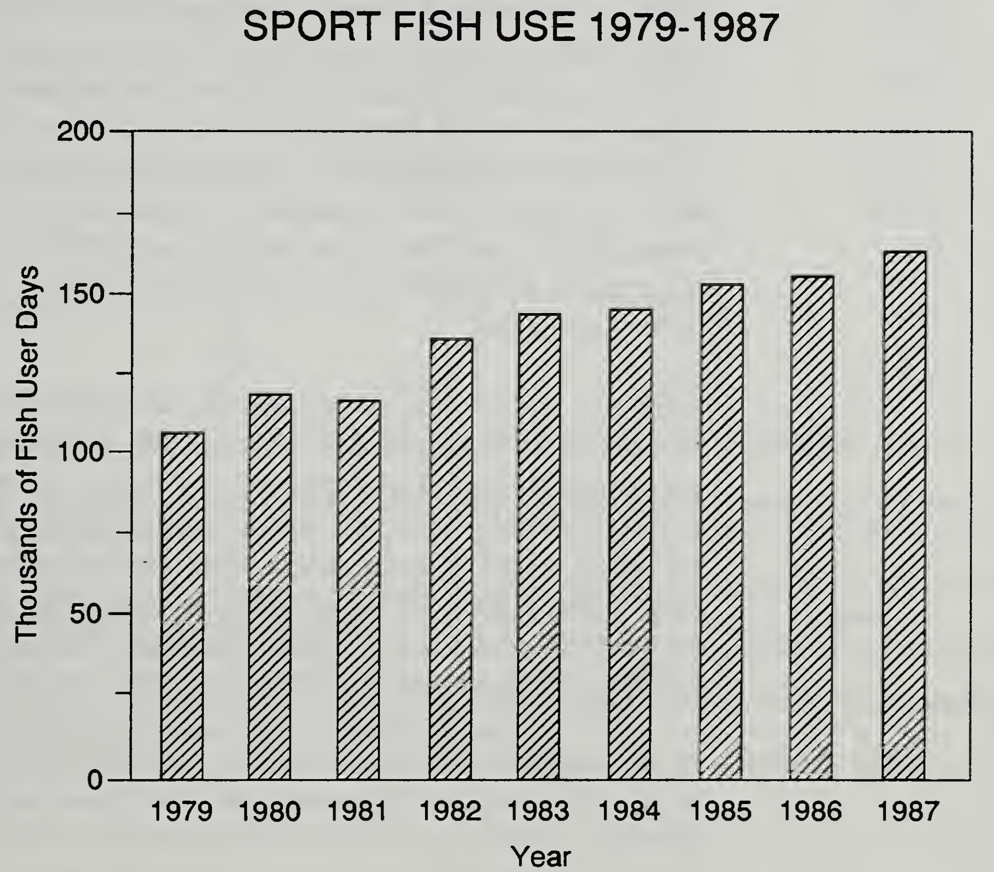
TABLE 3-13
NUMBERS OF FISH HARVESTED BY SPORT FISHERS

Area	*Year*	*Anadro-mous Salmon*	*Other Fish*	*Total*
Chatham	1984	56,269	89,195	145,464
	1985	84,357	74,657	159,014
	1986	48,877	63,122	111,999
Stikine	1984	9,487	21,365	30,852
	1985	8,553	11,434	19,987
	1986	6,878	23,148	30,026
Ketchikan	1984	57,889	57,125	115,014
	1985	53,351	73,807	127,158
	1986	59,097	68,800	127,897
Average Annual Total		128,250	160,880	289,130

Source: Database queries from the *Alaska Statewide Sport Fisheries Harvest Report*, Alaska Dept. of Fish and Game, Michael J. Mills, November, 1987 (Mills, 1987). Obtained with the assistance of Mark Schwan, Alaska Dept. of Fish and Game, Southeast Regional Office, 1989. The data represents sport fishing for fish linked to habitats on the Tongass National Forest. Haines-Skagway and Glacier Bay Census Areas are not represented in this data.

The numbers of fish harvested represent sport fishing effort. Effort is also represented by Fish User Days (FUD's) which each count for 12 hours of fishing time. Figure 3-6 shows the number of FUD's attributable to the National Forest from 1979 to 1987. Except for a small decrease in 1981, sport fishing effort has increased consistently from 1979 to 1987.

FIGURE 3-6



Source: Mills, 1987 and Personal Communications with Mark Schwan (ADF&G, 1989)

Hatcheries, Aquaculture and other Fish Enhancement. A variety of aquaculture projects, including hatcheries and fishery enhancement projects, have been developed on the Forest. Coordination and construction of projects to meet fisheries goals occurs at multiple levels and by a number of different organizations.

Comprehensive Salmon Plans have been developed for three areas of Southeast Alaska, including Northern Southeast, Southern Southeast, and Yakutat (Alaska Department of Fish and Game, 1984; Joint Southeast Alaska Regional Planning Teams, 1981; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present). These documents

include enhancement goals and attainment strategies. The goals are displayed in the demand portion of the fish section.

Three groups coordinate fish enhancement and development activities in Southeast Alaska: the Northern and Southern Southeast Regional Planning Teams (RPT's), and the Yakutat Salmon Planning Group. The Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development (FRED) facilitates the activities of the coordinating groups. Organizations which implement the aquaculture projects include the State of Alaska, private non-profit aquaculture organizations, the Regional Aquaculture Associations, the USDA Forest Service, and additional cooperators. Some examples of cooperators include: the timber industry, Trout Unlimited, and local communities.

Table 3-14 is a summary of the enhancement projects completed by the Tongass National Forest during the last 10 years. The table shows that an estimated potential production of approximately 11.5 million pounds of fish can be attributed to the 104 fisheries enhancement projects completed between 1980 and 1989. 6.4 million dollars of direct project costs were expended by the USDA Forest Service and at least 3.4 million dollars were invested by the Alaska Department of Fish and Game and the Regional Aquaculture Associations for these projects. Additional funds have been spent for inventory, planning projects and monitoring.

Of the projects completed, most have been fishways, stream stocking and large woody debris management, with the largest outputs anticipated from lake fertilization, fishways and lake stocking projects. Prior to 1980, a considerable number of additional projects were also implemented on the Tongass National Forest.

Fish Habitats. With over 40,000 miles of streams and 260,000 acres of lakes and ponds, the Forest provides abundant fish habitat. The habitat has been inventoried and classified, and estimates made of fish production. Management Indicator Species are used as a tool to help represent the value of the habitat for all fish species.

Channel Inventory. Perennial streams, outside of most wilderness, have been channel-type inventoried. Individual channel types have fairly consistent physical and biological characteristics (Marion et al., 1987). The channel types provide a system to measure the amount and quality of fish habitat and can be used to estimate their physical response and sensitivity to different management activities. Channel types have been categorized into distinctly different groups, called "stream process groups." The channel types and process groups are described in Appendix J.

TABLE 3-14
FISHERIES ENHANCEMENT PROJECTS COMPLETED 1980-1989

Enhancement Activity	*# projects*[1]	*Production (m lbs/yr)*[2]	*Cost (m $)*[5] *Federal*[3]	*Other*[4]
Fishways	26	3,861.9	3,353.8	205.0
Falls modification	5	63.5	92.0	0.0
Spawning channel	5	329.4	365.5	85.0
Debris removal	10	76.0	19.0	0.0
Lake fertilization	5	4,551.0	1,200.7	1,557.0
Lake stocking	8	1,242.0	521.1	1,170.3
Stream stocking	18	484.7	153.6	223.0
Rearing pond construction	7	16.3	86.6	0.0
Incubation boxes	3	833.9	53.0	105.2
Large woody debris management	15	81.6	564.6	30.0
Fish weir	3	NA	0.0	NA
TOTALS	104	11,540.7	6,409.9	3,375.5

Source: USDA Forest Service, Alaska Regional Office. Obtained from Ron Dunlap, Wildlife and Fisheries. Abbreviations: NA = not available; # = number; m = thousand.

[1] The project totals represent the number of activities completed at different locations. Repetitive annual investments at the same site (i.e. fertilizer applied to each lake annually) are not shown, although the costs of the repetitive treatments have been included in the cost totals.

[2] Estimated salmon production (available for harvest) is based on full utilization of habitat capability. The time it will take to reach full production varies with the species and fisheries management strategies regulating the fish stocks returning to the projects.

[3] Construction funds only. Alaska Department of Fish and Game salmon broodstock development costs associated with some fishway projects were not available.

[4] Combined investments of the Alaska Department of Fish and Game and the Regional Aquaculture Associations. Cooperative investment information for the majority of the projects involving these agencies was not available.

[5] Costs shown in the table are direct project costs (i.e. construction) and do not include indirect costs such as program planning.

Stream Class Inventory. Channel typed streams have also been categorized by stream class, a classification primarily associated with fish use. Class I streams are anadromous and high value resident fish streams, Class II streams are other resident fish streams, and Class III streams are managed for water quality. (See the glossary for more complete definitions.)

Table 3-15 displays, by Administrative Area of the Tongass, the estimated miles of streams, their process group and stream class.

TABLE 3-15
MILES OF STREAMS BY PROCESS GROUP, AREA AND STREAM CLASS [1]

Stream Process Group	*Class*	*Chatham*	*Stikine*	*Ketchikan*	*Total*
Low Gradient Floodplain	I	2,595	963	1,368	4,926
	II	84	188	15	288
	III	2	14	13	28
Alluvial Fan	I	517	58	140	715
	II	764	100	193	1,057
	III	115	98	30	243
Mixed Control Moderate Gradient	I	837	1,327	1,519	3,684
	II	502	357	83	942
	III	0	34	67	100
Large Low Gradient Contained	I	286	164	222	672
	II	14	28	0	42
	III	0	0	0	0
Moderate Gradient Contained	I	595	466	978	2,039
	II	173	206	114	493
	III	0	37	83	120
High Gradient Contained	I	24	107	53	184
	II	3,489	914	2,176	6,578
	III	7,477	4,856	5,515	17,847
Placid or Glide Streams	I	427	285	401	1,114
	II	55	55	16	127
	III	0	5	19	24
Lakes and Ponds [2]	I	162	195	155	512
	II	1	10	3	15
	III	0	0	0	1
Estuarine	I	347	157	173	677
	II	0	0	0	0
	III	0	0	0	1
Administrative Area Totals:	I	5,790	3,724	5,009	14,523
	II	5,082	1,859	2,601	9,542
	III	7,594	5,043	5,727	18,364
		------	------	------	------
FOREST TOTAL (miles)--all streams		**18,466**	**10,626**	**13,337**	**42,429**

Source: Tongass National Forest GIS queries

[1] See Appendix J for descriptions of process groups. Miles are adjusted for estimates of: 1) the uninventoried portions of the Wilderness areas, and 2) channels missed in the inventories. Additional unmappable streams are present, but nondetectable except with complete on-the-ground surveys. These streams cannot be mapped within the tolerances of the channel type inventory.

[2] Some small lakes and ponds are classified as stream channels in the inventory.

Fish Management Indicator Species

National Forest Management Act regulations direct the use of management indicator species (MIS) in forest planning to help display the effects of forest management. MIS are species whose population changes are believed to indicate the effects of land management activities. Through the use of MIS, the total number of species that occur within a planning area is reduced to a manageable set of species that represents, collectively, the complex of habitats, species, and associated management concerns.

For the Forest Plan Revision, pink salmon, coho salmon and Dolly Varden char were selected as Management Indicator Species. (The selection process is discussed in the Wildlife section of this chapter.) Dolly Varden char were selected to represent resident fish habitats; pink salmon to represent anadromous fish which are limited in their freshwater life-period by spawning gravel quality and quantity; and, coho salmon to represent anadromous fish that are generally limited in their freshwater life-period by stream and lake rearing area.

Fish Habitat Capability

Habitat capability is the carrying capacity: the maximum number of fish the habitat can produce. Population is the actual number of fish present at a given time. Populations tend to fluctuate naturally due to a wide range of factors, including harvest, climate, and species interactions, while habitat capability tends to be relatively constant. Habitat capability, for anadromous fish, is measured in smolts (the life stage of a fish that migrates from freshwater to saltwater) and in numbers of fish for resident species (fish that remain in freshwaters their entire life). Smolts are the "final" output from National Forest system lands to the open ocean. The Forest Service has very little control of, or effect on, fish survival once the fish enter the ocean.

Estimates of habitat capability for each of the MIS, occurs in two steps. First, the potential habitat capability of Forest habitats is estimated. Second, estimates of the effects of management activities, such as habitat enhancement and timber harvest, on the potential habitat capability are made.

Capability Models

Habitat capability models were developed for the three Management Indicator Species. The models that were developed are based on the channel type/stream class inventory. These models assume a relationship between fish habitat capability and stream physical characteristics (channel type). Streams located in the lower portions of a watershed typically have the highest capability. Mid-watershed channels generally have a lower capability, while the highest gradient channels in the upper portion of the watershed have the lowest productivity.

The capability models are somewhat different for pink salmon than for coho salmon and Dolly Varden char. The coho and Dolly Varden models are based on numbers of rearing (stream dwelling) fish, since these two species spend a

number of years in streams. The pink salmon model is based on the availability of spawning gravels since these fish emerge from the stream gravels in the spring as smolts and immediately migrate downstream to the ocean. In each case, the life stage that is considered to be limiting the amount of habitat capability is used in the model.

Data used to develop these models came from all known reliable sources of information in Southeast Alaska, including studies by the Alaska Dept. of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the USDA Forest Service.

Table 3-16 shows the habitat capability estimated for the three management indicator species, by geographical zone on the Tongass, as modeled for the natural habitat capability and with no human-related reductions or increases. (Model details are in Appendix B.) The habitat capability in 1954 is assumed to be the same as natural, since no large-scale timber harvest had previously occurred on the Tongass. Also, there was no significant fish habitat enhancement prior to 1954. The locations of the geographical zones are shown in Figure 3-1.

Table 3-16 shows that habitat capability for all species is greatest on the Chatham Administrative Area, followed by the Ketchikan Area and the Stikine Area. Total Forest-wide smolt habitat capability for pink salmon is approximately 2.4 billion smolt and for coho salmon 19 million smolt. For Dolly Varden char, the habitat capability is estimated at 68 million fish.

Review of the models by an interagency group of biologists indicated that the coho salmon model accurately estimated coho numbers, based on smolt migration studies. The pink salmon habitat capability model did not predict pink numbers as well as the coho model, as indicated by the distribution of commercial pink salmon harvest across Southeast Alaska. However, for pink salmon it was also acknowledged that harvest is disproportionately targeted in some areas, hatchery fish some years make up a large portion of the commercial harvest, and there tend to be very large fluctuations in pink salmon production because of the nature of the species. The Dolly Varden capability estimates seemed plausible to the reviewing group, however there is insufficient knowledge of the distributions of Dolly Varden populations to specifically assess the accuracy of the numbers.

Estimates of current habitat capability, that is, natural capability adjusted for past management effects (which includes habitat enhancement), are discussed in the following section.

TABLE 3-16
NATURAL (1954) HABITAT CAPABILITY FOR PINK & COHO SALMON, AND DOLLY VARDEN CHAR

Geographic Zone	*Pink Salmon (M Smolts)*	*Coho Salmon (M Smolts)*	*Dolly Varden Char (M Fish)*
C01	12,793	38	307
C02	110,424	341	1,460
C03	5,655	37	300
C04	1,540	8	125
C05	43,783	126	543
C06	106,022	324	1,537
C07	1,623	20	44
C09	41,021	164	997
C10	83,517	413	2,249
C11	10,818	97	746
C12	75,800	333	1,582
C13	27,082	195	1,600
C14	32,218	404	1,223
C15	274,296	932	4,498
C16	1,007	15	78
C17	8,421	387	1,902
C18	42,029	158	795
C20	5,310	135	415
C21	32,870	366	1,089
C22	134,202	1,713	2,390
C23	97,685	1,110	6,379
C24	85,446	1,060	1,876
C25	31,800	90	764
Chatham Area:	**1,265,362**	**8,466**	**32,899**
S01	73,572	851	1,930
S02	13,882	69	208
S03	103,414	670	2,048
S04	37,965	216	530
S05	21,719	110	435
S06	22,372	191	658
S07	17,792	105	349
S08	20,804	446	1,348
S09	54,996	388	1,796
S10	95,176	463	1,530
S11	12,622	145	327
S12	23,969	1,323	2,764
S13	20,196	104	244
S14	1,665	7	46
Stikine Area:	**520,144**	**5,088**	**14,213**
K01	2,304	94	308
K02	1,759	126	269
K04	52,406	468	2,297
K05	22,590	209	885
K06	187,208	1,480	4,967
K07	25,941	339	1,366
K08	84,156	446	1,668
K09	8,580	109	437
K10	8,333	53	268
K11	25,183	277	1,005
K12	5,557	104	511
K13	161,898	1,651	6,179
K14	19,302	147	577
K15	2,844	15	80
Ketchikan Area:	**608,061**	**5,518**	**20,817**
TOTAL FOREST:	**2,393,567**	**19,072**	**67,929**

Source: Habitat Capability Models (see Appendix B)

Modeling Effects of Past Management

The effects or impacts on the fish resources can be categorized into two parts: a) the potential negative effects of management activities on fish habitat capability, and 2) the positive effects of habitat enhancement on the fisheries resource. Effects are primarily measured on the three fish Management Indicator Species. These effects are measured differently for pink salmon, which typically are spawning habitat limited species; and coho salmon and Dolly Varden char, which are typically fresh-water rearing habitat limited.

Pink salmon. Pink salmon habitat capability relies on egg survival in the spawning gravels during egg incubation. A number of studies have shown a relationship between egg survival and water quality criteria, including intergravel fine sediments, temperature waterflow, and other factors (reviewed in Reiser and Bjornn, 1979). Studies have been conducted of Southeast Alaska's pink salmon, including relationships between instream sediment, egg survival and pink salmon returns to streams (Sheridan et al, 1984; Pella and Myren, 1974; Sheridan, 1982). None of the Southeast Alaska studies have provided a conclusive tie between upland (land not immediately adjacent to streams) management and reduced numbers of returning fish. This may be due to the sensitivity of the biological investigations, or because the overriding factor limiting fish returns to Southeast Alaska's streams is ocean survival. Ocean survival is influenced by food, predators, offshore and nearshore harvests, climate, water temperature and other factors.

It is not clear how research results on effects of upland management on fish resources in studies outside of Alaska should be resolved with the information available from research studies in Alaska. Studies outside of Alaska show a reduction in fish numbers resulting from certain types of upland management practices (Reiser and Bjornn, 1979). The studies inside Southeast Alaska have not shown a direct tie between upland management and fish numbers, therefore effects of past management activities on pink salmon are not quantitatively evaluated here. However, in a qualitative sense, with increased disturbance from land management activities, an increased risk of change to pink salmon habitat capability could be expected. The amount of land management disturbance, by geographic area of the Forest (geozones), is included in the information presented in the section on environmental consequences.

Increases in the habitat capability for pink salmon have occurred through enhancement projects, such as fishways and spawning channels. Table 3-17 shows current (1988) pink salmon capability for the Forest resulting from naturally available habitat, plus the additional habitat resulting from the construction of fishways.

TABLE 3-17
CURRENT (1988) CAPABILITY ESTIMATES, ADJUSTED FOR PAST ENHANCEMENT & IMPACTS

Geographic Zone	*Pink Salmon (M Smolts)*	*Coho Salmon (M Smolts)*	*Dolly Varden Char (M Fish)*
C01	12,792	38	307
C02	116,833	352	1,418
C03	5,686	37	300
C04	1,540	8	123
C05	43,783	126	543
C06	106,022	316	1,509
C07	1,623	20	44
C09	41,021	156	967
C10	83,517	403	2,211
C11	10,877	98	746
C12	75,800	333	1,582
C13	27,230	195	1,600
C14	32,218	404	1,223
C15	274,296	932	4,498
C16	1,007	15	78
C17	8,421	387	1,902
C18	42,029	157	789
C20	5,310	135	415
C21	32,870	366	1,089
C22	134,202	1,109	2,390
C23	97,685	1,713	6,379
C24	85,743	1,060	1,876
C25	33,067	90	764
Chatham Area:	**1,273,572**	**8,450**	**32,753**
S01	79,812	916	1,912
S02	13,882	69	208
S03	103,414	661	2,024
S04	37,965	215	526
S05	24,965	125	433
S06	22,372	190	656
S07	17,792	104	348
S08	20,804	446	1,346
S09	61,303	383	1,714
S10	110,299	463	1,530
S11	12,622	145	327
S12	23,969	1,323	2,764
S13	20,196	104	244
S14	1,665	7	45
Stikine Area:	**551,060**	**5,151**	**14,077**
K01	2,350	95	308
K02	1,759	126	269
K04	55,872	477	2,263
K05	22,590	209	885
K06	189,793	1,486	4,900
K07	25,941	339	1,366
K08	85,705	401	1,548
K09	8,580	109	437
K10	8,333	53	268
K11	25,625	279	981
K12	5,557	104	511
K13	174,911	1,651	6,179
K14	19,657	147	577
K15	2,844	15	80
Ketchikan Area:	**629,517**	**5,491**	**20,570**
TOTAL FOREST:	**2,454,149**	**19,092**	**67,400**

Source: Habitat Capability Models (see Appendix B)

Comparison of Tables 3-16 and 3-17 shows an increase in pink salmon capability of approximately three percent between 1954 and 1988. The increase ranges from one percent on the Chatham Area (known to be an underestimate due to modeling considerations) to six percent on the Stikine Area. Since no negative impacts to pink salmon habitat capability are quantitatively predicted, only increased access to stream habitat due to construction of fishways is represented.

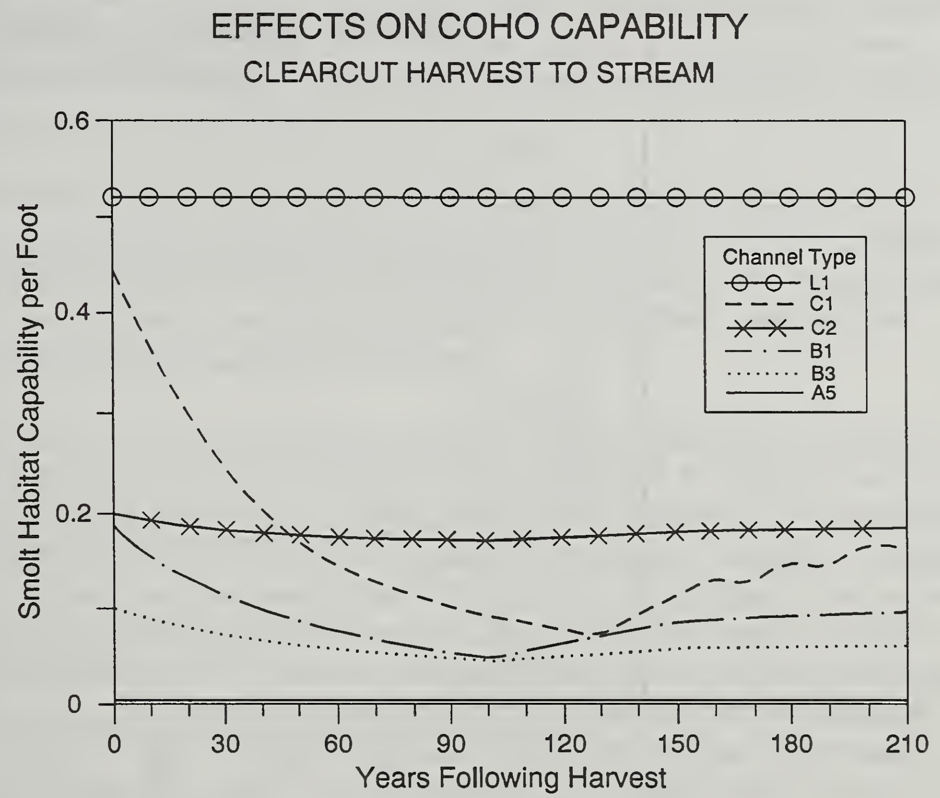
Coho salmon and Dolly Varden char. Coho salmon and Dolly Varden char habitat capability are dependent on the availability of suitable rearing area. Dolly Varden have two life strategies: some are anadromous fish, migrating to the sea for a portion of their life; others live entirely in freshwaters. Dolly Varden, then, represent those species of fish which live in all types of stream habitat. On the other hand, coho salmon, a key public interest species, are for the most part only anadromous, residing in freshwaters for two to five years.

Murphy et al. (1986) shows that for both coho and Dolly Varden, winter and summer survival is in large part a function of woody debris and pools. The presence of woody debris in riparian areas is the basis of habitat capability models developed by an interagency group including the National Marine Fisheries Service, the Alaska Department of Fish and Game, and the US Fish and Wildlife Service. The capability models postulate that a key large woody debris piece, a piece large enough to hold all the smaller pieces in place for a given stream, is necessary. Another important model assumption is that the input of woody debris in the old-growth situation is equal to the output of woody debris due to decay, washout and any other loss. (Further model details can be found in Appendix B and the planning record.)

Effects on habitat capability for coho and Dolly Varden are modeled by identifying the number of key pieces of woody debris with no habitat disturbance, adding key pieces of large woody debris from second growth sources, and subtracting losses of large woody debris due primarily to decay. Each channel type is modeled separately since each is dependent to a different degree on number and size of key pieces of debris.

To model the past effects of timber harvest on stream systems, it was assumed that clearcut timber harvest to the stream edge was predominant before 1979. The model assumes that woody debris already fallen in the stream is left in place following timber harvest activities. Figures 3-7 for coho and 3-8 for Dolly Varden show how habitat capability could be expected to change over time with clearcut harvest to the streambank in sample channel types. The changes in capability are calculated for each channel type over a period of 210 years.

FIGURE 3-7 [1]

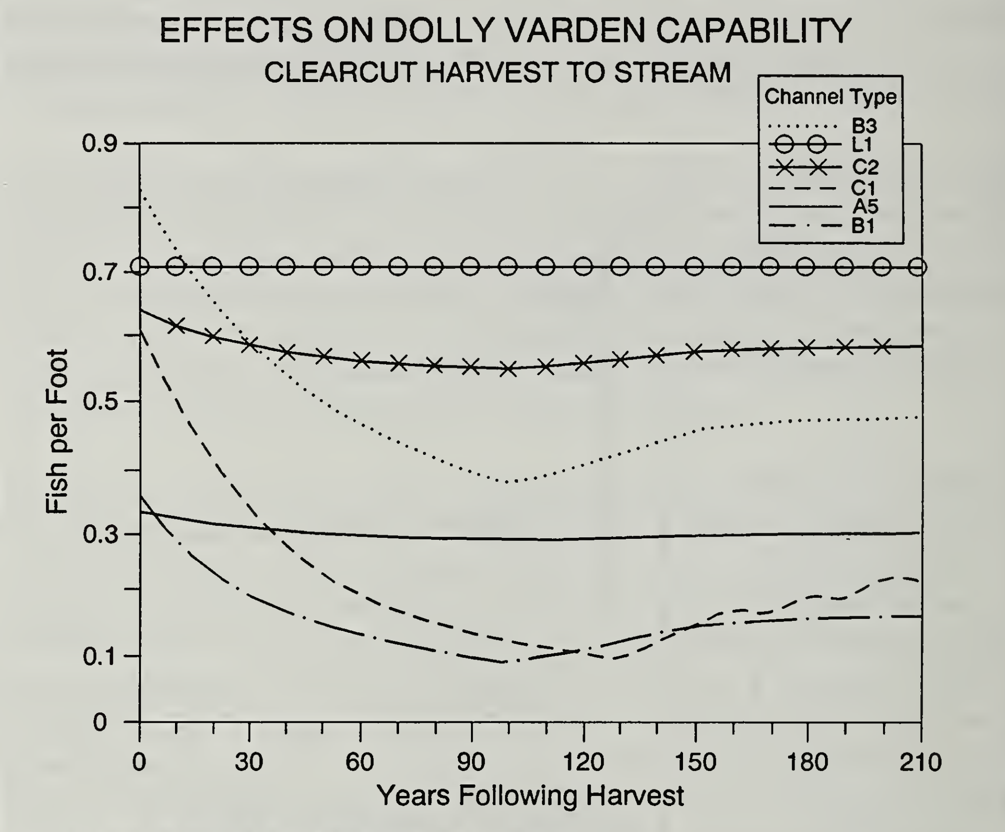


Source: Coho Habitat Capability Model (Appendix B)

[1]Outputs are in smolts per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities prior to 1979. Current management direction is more closely approximated by the display in Figure 3-9.

These figures show that habitat capability differs significantly by channel type, and that streamside harvest results in dissimilar long-term effects on habitat capability. For instance, Figure 3-10 shows that coho habitat capability of channel types L1 (Placid/Glide process group) and C1 (Low Gradient Floodplain process group) are similar in old growth (shown as zero years following harvest). However, since the rearing capability for C1 streams is dependent on very large woody debris (key piece size greater than 36 inches in diameter), and the rearing capability for L1 channels is not dependent on large woody debris, following clearcut harvest there would be a large reduction in capability for C1 channels and no reduction in L1 channels.

FIGURE 3-8 [1]



Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities prior to 1979. Current management direction is more closely approximated by the displays in Figures 3-10 and 3-11.

The figures indicate that the maximum capability reduction following clearcut harvest occurs at approximately 90 to 130 years following streamside timber harvest. This corresponds to the period in which the input of second growth large woody debris to a stream system is estimated to become greater than the decay of large woody debris existing in the stream prior to harvest.

The following two sections discuss the effects of buffers and cumulative effects on habitat capability for coho salmon and Dolly Varden char.

Buffers. Buffer strips along streams can be designed in a number of different ways depending on the management objective. Some buffer strips result in little or no reduction in fish habitat capability, while others may result in a capability loss. Some buffer strips may actually increase fish production during specific periods of the year. In large part, change in habitat capability depends on the management prescription applied in the riparian area. For instance, if a "100-foot

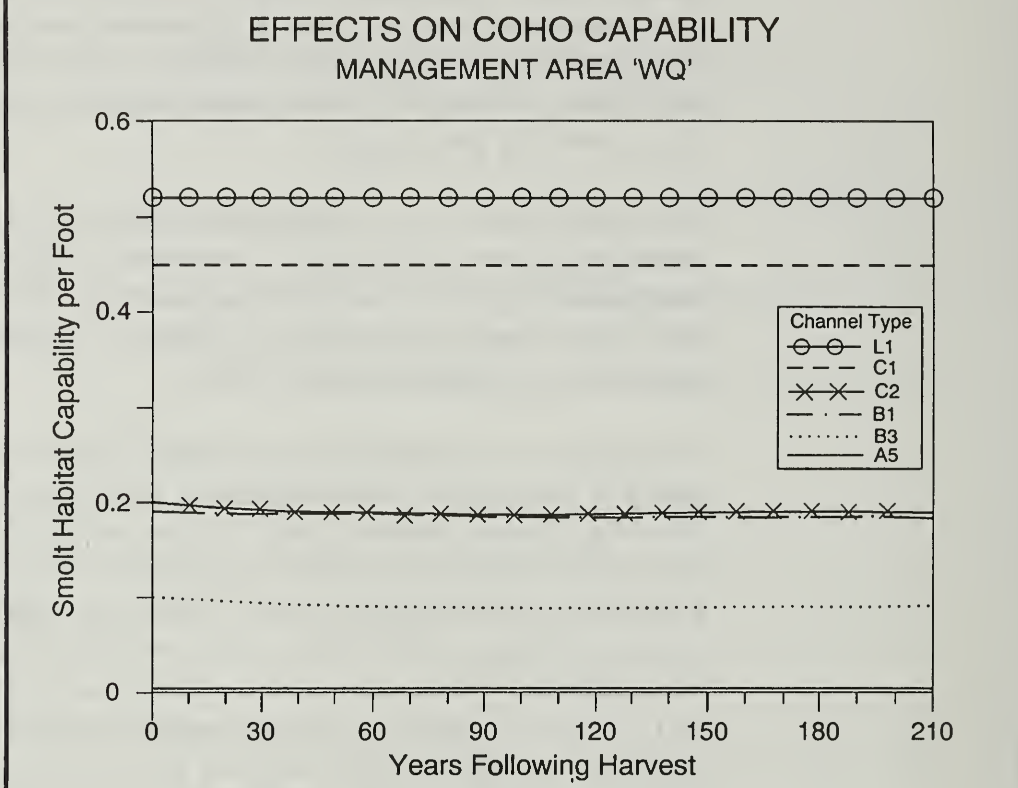
no harvest" buffer strip were prescribed, it is unlikely that any reduction in woody debris sources would occur since research shows that 100 percent of the woody debris originates from within 100 feet of the stream bank. However if a 30-foot buffer strip were prescribed, then a 20 percent reduction in potential to provide large woody debris to the stream could occur (Murphy et al., 1987). There would likely be a reduction in the habitat capability for those species requiring woody debris for pool habitat.

Two prescriptions for managing riparian areas have been developed for the Forest Plan revision. These are: 1) Fish Habitat and Water Quality Requirements (abbreviation code WQ), and 2) Stream and Lake Protection (abbreviation code SL). The complete prescriptions are located in Appendix F, including the guidelines for streamside timber harvest.

The objective of the Fish Habitat and Water Quality Requirements management area is to comply with the National Forest Management Act Regulations of no serious and adverse effects to water quality and fish habitat, while the objective of the Stream and Lake Protection management area is to maintain or enhance aquatic biological productivity. Both of these prescriptions allow timber harvest along some streams. The effect on coho and Dolly Varden habitat capability following timber harvest is shown for sample channel types in Figures 3-9 through 3-11 for the Fish Habitat and Water Quality Requirements (WQ) Prescription. Capability changes for Dolly Varden are shown for both Class I and Class II streams, since they would be differently managed. (Coho are only found in Class I streams.) Additional information and figures on the Stream and Lake Protection (SL) management area prescription are located in the Environmental Consequences portion of this fish section.

The WQ and SL management area prescriptions emphasize the design of windfirm buffer areas, and the habitat capability models assume that no windthrow occurs other than natural events in old-growth forests. Natural levels may be very high, such as resulted from the wind storm on the Yakutat Forelands during the winter of 1980-1981. Although the effects of windthrow are not modeled, from knowledge of past activities it is likely that some unplanned, or accelerated, windthrow will occur. Windthrown timber when left in the stream, continues to provide fish habitat associated with large woody debris. However, over the long term (50-150 years), some reduction in habitat capability may occur as the large woody debris decays. Any effects of accelerated windthrow associated with the riparian prescriptions generally occur only in areas of timber management.

FIGURE 3-9 [1]



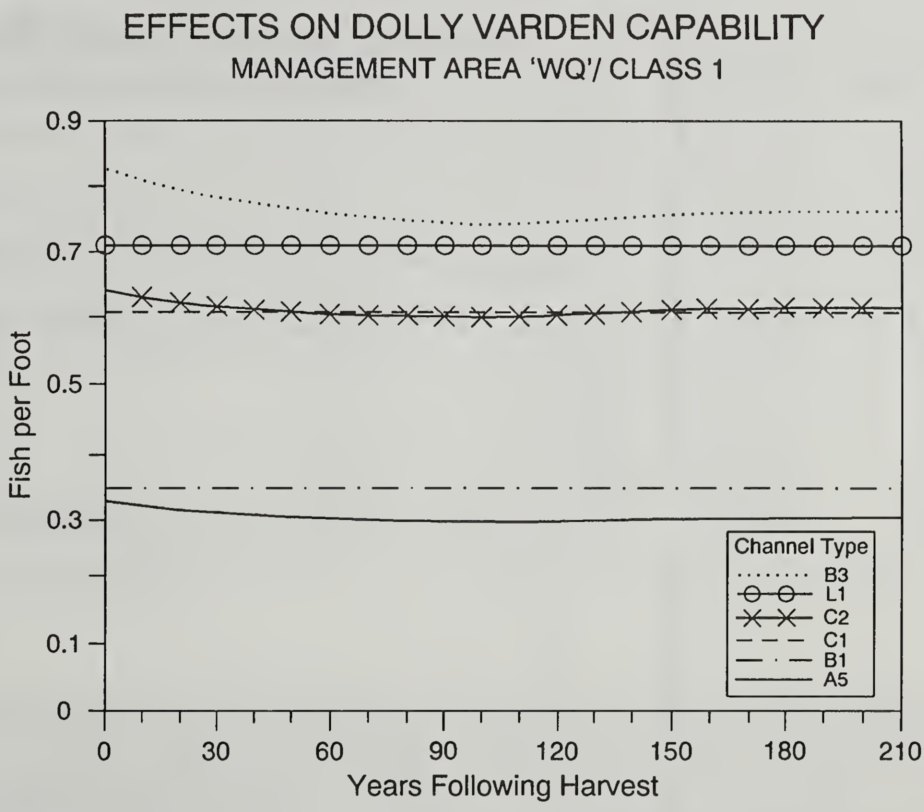
Source: Coho Habitat Capability Model (Appendix B)

[1] Outputs are in smolts per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24.

Cumulative effects on habitat capability. Calculating the cumulative effects of past management activities on coho salmon and Dolly Varden char results in the geozone capability estimates shown in Table 3-17.

The effects of clearcut harvest (Figures 3-7 and 3-8) are used in estimating the reduction in habitat capability from 1954 to 1979, since clearcut harvest to the streamside was often the common practice during those years. The effects of implementing the Fish Habitat and Water Quality Requirements Prescription (WQ) are used to estimate the average reduction in capability that occurred from timber harvest practices during the period from 1979-1988. During the period 1978-1988, a combination of streamside leave-strip, selective and clearcut harvest prescriptions were used.

FIGURE 3-10 [1]

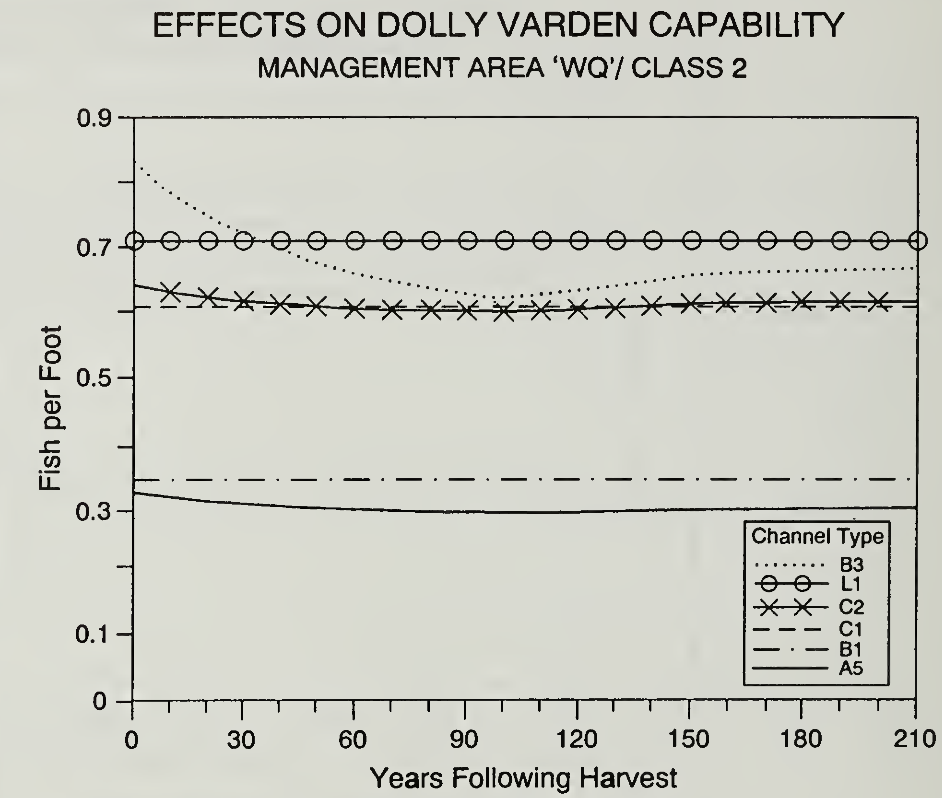


Source: Dolly Varden Habitat Capability Model (Appendix B)

[1] Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24.

Table 3-18 summarizes the 1988 geozone data shown in Table 3-17, and compares this information to the 1954 data shown in Table 3-16. Comparisons are in terms of 1954, since it was prior to the onset of large-scale industrial logging on the Tongass. The table also shows the benefits resulting from fishway construction. Table 3-18 shows that current Forest-wide coho salmon capability is estimated to be 100.1 percent of 1954's capability. Without the construction of fish ladders to access additional stream habitat, the current capability would be 99.3 percent of 1954's capability. The largest decrease in habitat capability, without enhancement, has been 1.4 percent on the Ketchikan Area. The largest percentage of coho fish passage enhancement has also occurred on the Ketchikan Area (.9 percent) followed by the Stikine (.7 percent) and Chatham (.2 percent) Areas.

FIGURE 3-11 [1]



Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24.

Table 3-18 also shows estimates of capability changes for Dolly Varden char. Forest-wide, current Dolly Varden capability is 99.2 percent of the 1954 value. The greatest magnitude of change has occurred on the Ketchikan Area, followed by the Stikine and the Chatham Areas. These relationships result from the extensive timber harvest on portions of Prince of Wales Island between 1954 and 1979, and the vast acreages of unroaded and unharvested areas on the Chatham Area.

TABLE 3-18
SUMMARY OF HABITAT CAPABILITY CHANGES FOR COHO & DOLLY VARDEN 1954-1988 (THOUSANDS OF FISH)

Specie[1]	*Statistic*	*Chatham*	*Stikine*	*Ketchikan*	*Forest-wide*
Coho	1954:	8,466	5,088	5,518	19,072
Coho	1988 with no enhancement:	8,432	5,063	5,441	18,936
	Percent of 1954:	99.6%	99.5%	98.6%	99.3%
Coho	1988 with enhancement:	8,450	5,151	5,491	19,092
	Percent of 1954:	99.8%	101.2%	99.5%	100.1%
DV	1954 Capability:	32,899	14,213	20,817	67,929
DV	1988 Capability:	32,753	14,077	20,570	67,400
	Percent of 1954 capability:	99.6%	99.0%	98.8%	99.2%

Source: Habitat Capability Models (see Appendix B)
[1]DV = Dolly Varden char

The changes due to timber harvest prior to 1988 will likely result in long-term future changes in habitat capability as depicted by the trends shown for individual channel types in Figures 3-7 through 3-11. Forest-wide, with no additional timber harvest or habitat enhancement projects, the maximum change predicted for coho salmon occurs in approximately the year 2075 and is less than a one percent reduction of the 1954 habitat capability. As the area of evaluation is reduced in size, changes in habitat capability become more pronounced. For instance, for the Administrative Areas of the Tongass, the maximum change ranges from a 1.5 percent reduction on the Ketchikan Area to a .8 percent increase on the Stikine Area. Individual geozones have even greater potential changes: Geozones C04, C06, C09, C10, K08 and S14 each could have more than a five percent reduction in habitat capability by the year 2075. The greatest reduction, 14.8 percent, is estimated for K08 on Prince of Wales Island. (Many of the riparian areas in K08 were clearcut harvested to the streambank during the 1960's and 1970's using techniques common during that period of time.) Five geozones are predicted to have increases in habitat capability (C02, K01, K04, S05 and S06), with the largest on S05 with 12.6 percent.

The models estimate that Dolly Varden char could decrease by about 1.5 percent from the 1954 level, Forest-wide, by the year 2075 with no further enhancement or timber harvest activities. The reduction ranges from 1.1 percent on the Chatham Administrative Area to 2.1 percent on the Ketchikan Administrative Area. Decreases of more than five percent are predicted for Geozones C06, C09, K08, S09 and S14, with the greatest decrease just over 10 percent in KO8 (central portion of Prince of Wales Island).

The model calculations represent one aspect of the effects of land management activities on coho and Dolly Varden habitat capability: pools formed by large woody debris.

Other factors

Other environmental factors resulting from management activities may also affect habitat capability for the management indicator species. Some of these factors are included in the following discussion.

Temperature. Summer high and winter low water temperatures influence fish survival and condition. Water temperature affects the metabolic rate of aquatic organisms and can affect the migration timing of adult and juvenile fish. Harvest of streamside vegetation can affect water temperature.

Some stream systems are particularly sensitive to high temperatures, including slow-flowing streams with southerly aspects, and streams with shallow lake and muskeg sources. Timber harvest is suspected of raising stream temperatures to a level which may contribute to adult fish kills. Data has been compiled by the Alaska Cooperative Forestry/Fisheries Working Group (Gibbons, 1989) on all known instances of fish kills in Southeast Alaska. The data indicates that fish kills have occurred in both logged and unlogged areas. Further identification of the relationships between fish kills, factors causing these fish kills (i.e. environmental conditions such as temperature, long periods of reduced rainfall, numbers of returning salmon, dissolved oxygen content, tidal flow and watershed characteristics), and the relationship to timber harvest practices is under review by the Alaska Cooperative Forestry/Fisheries Working Group.

Low winter temperatures can lead to detrimental winter stream conditions, such as anchor ice formation and freezing of spawning gravels. Pool size is reduced with surface and anchor size. Low temperatures may be aggravated by streamside vegetation canopy removal, but estimating the effects are very difficult due to the influences of intermittent snow or ice cover and high variability in winter air temperature, wind and precipitation patterns commonly found in Southeast Alaska. Identification of temperature-sensitive streams, and watersheds requiring special management due to temperature considerations, can only occur during site-specific project planning.

Fish passage and roads. Fish passage is the ability of both adult and rearing fish to move both up and down stream. In adults, movement is often to the spawning gravels. In rearing fish, movement is to seek suitable, seasonally required habitat. Stream crossings of roads have the potential to reduce movement of fish. Stream crossing standards and guidelines require fish passage, where needed; however, in some cases, primarily on small resident fish streams, management decisions may be to not provide fish passage.

Marine Systems. A number of activities on National Forest System lands indirectly affect marine systems, estuaries, and their productivity. The primary activities include log transfer and storage sites. These activities require State Tidelands permits and U.S. Army Corps of Engineers permits and the activities must be compatible with coastal zone management policies. For further information on log storage and transfer and their effects, see the Transportation section of this document. (References: Sedell and Duval, 1985; Robinson-Wilson and Jackson, undated - approximately 1986; Faris and Vaughan, 1985.)

Summary

The Tongass Land Management Plan (1979, p. 92) described an objective for fish on the Tongass National Forest to "preserve the biological productivity of every fish stream on the Tongass." Forest-wide, management has, for the most part, met the goal. Cumulatively, across the Forest since 1954, there has been an estimated reduction in habitat capability of less than one percent for coho salmon and Dolly Varden char, and a three percent increase in habitat capability for pink salmon. However, in specific geographical areas, such as on portions of Prince of Wales Island, habitat capability has been, and likely will be, substantially reduced (from 1954, currently a 10 percent reduction and a 15 percent reduction could occur by the year 2075). Factors represented in these changes include decreases in habitat capability for coho and Dolly Varden due to streamside timber harvest of large woody debris sources and increases in available habitat due to the construction of additional fish access. Other factors may affect habitat capability for all three species, but quantifying these effects (such as temperature and watershed disturbance) on a Forest-wide basis would be very difficult to substantiate based on the data and research available.

Demand

In all public scoping, a common advocacy of the public is the maintenance or improvement of fish habitat values. Demand from the public for subsistence, commercial and sport harvested fish remains very high. Demand for subsistence fish is discussed in the Subsistence section of this chapter, while commercial and sport fish demand are reviewed in this section. The commercial fish demand is based on goals set by Regional Salmon Planning Teams. Sport fish demand is estimated by projecting past use trends into the future.

Commercial Fish. Demand for commercial fish is difficult to quantify since it depends on numerous factors, including price, international markets, and numbers of participants in the fisheries. However, in order to quantify reasonable production goals, Regional Salmon Planning Teams set targets for fish production for the year 2000 (Alaska Department of Fish and Game, 1984; Joint Southeast Alaska Regional Planning Teams, 1981; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present). The salmon production goals can be used as an indication of the demand for commercial fish on the Tongass. They represent what is thought to be a realistic and attainable goal in the rehabilitation of Southeast Alaska's salmon harvests.

The difference between the salmon production goals for future harvests and current harvests are referred to as the GAP, and are shown in Table 3-19 and Figure 3-12. The GAP is calculated for all five species of commercially harvested salmon.

The Regional Comprehensive Salmon Plan for Southeast Alaska, excluding Yakutat, defines GAP as the difference between the Present Potential Harvest (the harvest possible when all current management strategies are at their full capacity of salmon production) and the Planned Harvest Objective (the harvest level needed to return runs of salmon to levels recorded at the turn of the century). The GAP for Yakutat is the difference between the Planned Harvest Objective minus the Present Harvest (current average harvest, not including the power troll fisheries). National Forest habitats are estimated to contribute approximately 80 percent of the fisheries in Southeast Alaska represented by the present harvests, year 2000 goals and the GAP.

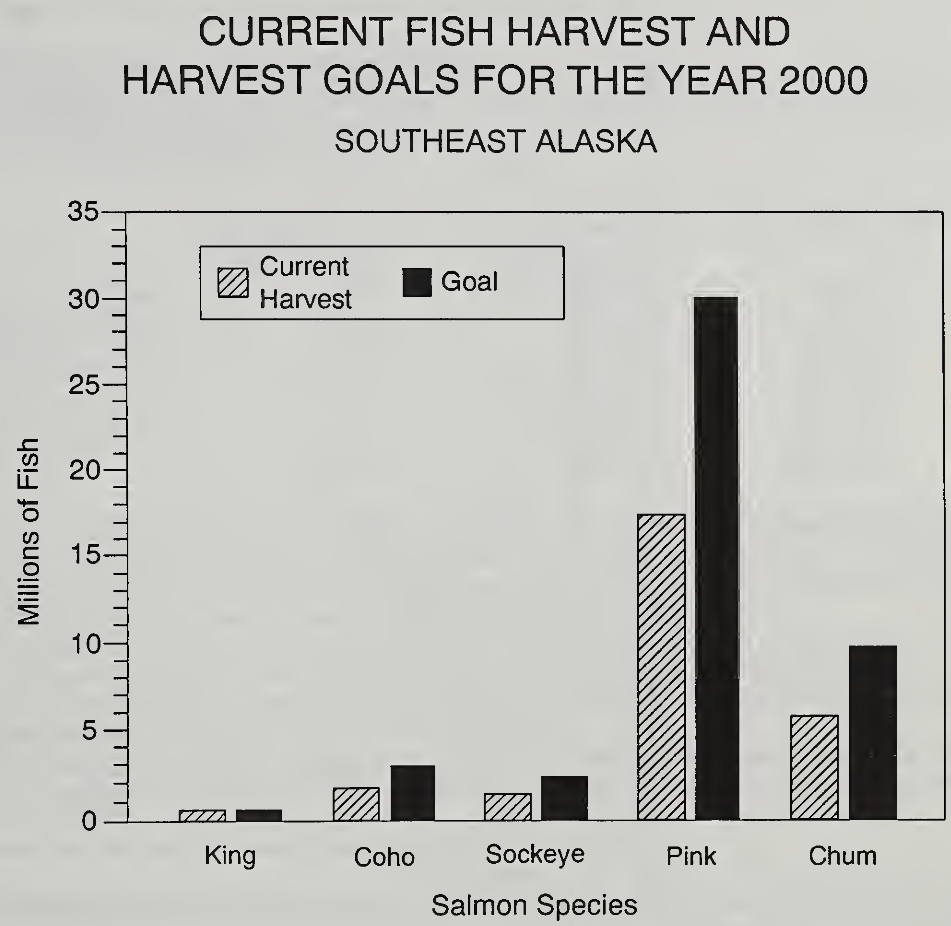
Table 3-19 and Figure 3-12 show that for Southeast Alaska king salmon production is at approximately the goal set for the year 2000. All other salmon species are between 58 and 61 percent of their year 2000 production goal. Some of the GAP in production will come from habitats, hatcheries, and other facilities not located on the National Forest or result from investments other than by the National Forest Service.

TABLE 3-19
GAPS IN YEAR 2000 FISH PRODUCTION FOR SOUTHEAST ALASKA (Number of fish) [1]

	Present Harvest[2]	*Year 2000 Goals*[3]	*GAP*	*Percent*[4]
King Salmon	494,663	544,000	49,337	91
Coho Salmon	1,710,043	2,825,000	1,114,957	61
Sockeye Salmon	1,343,618	2,325,000	981,382	58
Pink Salmon	17,394,080	30,150,000	12,755,920	58
Chum Salmon	5,703,535	9,713,000	4,009,465	59

Sources: Joint Southeast Alaska Regional Planning Teams, 1981; Alaska Department of Fish and Game, 1984; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present; Alaska Department of Fish and Game, 1989 (1988 Finfish Fisheries Regional Information Report)
[1]See text and the following notes.
[2]Present harvest represents the following: For Yakutat, average of the set gill net fishery from 1984 to 1988. For Southeast Alaska, excluding Yakutat, the current potential harvest if all habitat, improvement projects, and aquaculture facilities were producing fish to their maximum capability. Current harvests are generally not equal to the present potential harvest.
[3]As established by the Regional Planning Teams for Northern and Southern Southeast and Yakutat.
[4]The present potential harvest, as a percentage of the planned harvest objective.

FIGURE 3-12

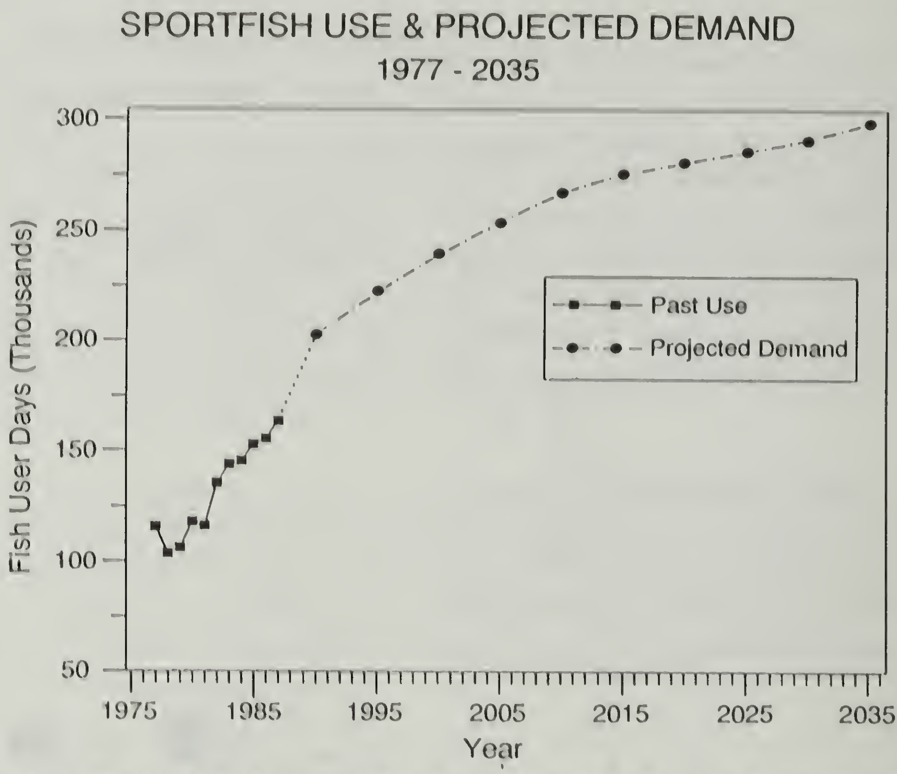


Source: Table 3-19

Sport Fish. Sport fish demand is calculated using past sport fishing use and projecting population changes from the locations where the sport fish demand is generated. Data for current use and origin of that use was obtained from Mills (1989) and Mills (pers.comm., 1989). Current use, and anticipated future demand are shown in Figure 3-13.

Sport fish use is almost always a very small portion of the total anadromous fish harvest. The majority (usually as great as 95 percent) of the harvest is commercial fish. As the demand for sport fish increases, allocation changes of fish resources may be required. These changes would occur through actions of the Alaska Department of Fish and Game, the Board of Fisheries and the Alaska State Legislature.

FIGURE 3-13



Source: Mills, 1987; Personal Communications with Mark Schawn and M. Mills (ADF&G, 1989) Appendix B

Contribution of the Tongass. Comparison of current harvest and the goals for fish production in Southeast Alaska indicates that harvest is at approximately the target set by the Regional Salmon Planning Teams for king salmon, and approximately 40 percent percent below the targets for the other species of salmon.

Table 3-20 compares the estimated habitat capability of the Forest, the goals for production set for the year 2000 by the Regional Salmon Planning Teams, and the current harvest. The Forest is estimated to be capable of producing commercial harvests totaling approximately 110 million pounds. Consideration of Southeast Alaska's hatchery contribution is important to the statistics in Table 3-20. Hatcheries supply a portion of the current harvest, and are expected to supply a considerable portion of the year 2000 goals. Hatcheries are not included in the estimated National Forest habitat capability.

In order to attain the year 2000 goals, a combinations of strategies will be necessary, including enhancement on National Forest system lands. Other strategies may include the construction or expansion of hatcheries, construction of enhancement projects on non-Federal lands, changes in fishery management,

or other, as yet undetermined enhancement methods (reviewed in the Regional Salmon Enhancement Plans).

TABLE 3-20
ESTIMATED HARVEST, CAPABILITY AND YEAR 2000 GOALS FOR THE TONGASS NATIONAL FOREST
(in Thousands of Pounds)

	Estimated Current Harvest[1]	*Estimated Capability*[2]	*Year 2000 Goals*[3]
King Salmon	3,810	7,259	6,920
Coho Salmon	10,874	10,475	14,322
Sockeye Salmon	6,404	7,589	14,012
Pink Salmon	70,772	57,703	79,596
Chum Salmon	14,414	27,581	70,711
Total	106,274	110,607	185,561

Sources: Joint Southeast Alaska Regional Planning Teams, 1981; Alaska Department of Fish and Game, 1984; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present; Alaska Department of Fish and Game, 1989 (1988 Finfish Fisheries Regional Information Report); Habitat Capability Models (see Appendix B)

[1]Commercial fish harvest from Southeast Alaska, averaged for 1978-1987, multiplied by a factor of .8 to represent National Forest habitats. These figures include production from hatcheries.

[2]Estimated capability of National Forest habitats to produce salmon. This does not include production from hatcheries.

[3]Goals for the year 2000 as developed by the Regional Planning Teams and multiplied by a factor of .8 to represent National Forest habitats. These figures also include production from hatcheries.

Opportunities

There are opportunities in the Revision of the Tongass Land Management Plan to address fish habitat and production in a number of different ways. Options for habitat management include maintaining the status quo, allowing slight additional reductions in fish habitat capability, and providing for considerable increases in fish production. Some members of the public (Tongass Land Management Plan Revision Scoping Database, 1988), as well as Federal agencies (National Marine Fisheries Service, 1988 and see Appendix O), have requested "no-harvest" buffer strips along all streams (some advocate no harvest along all anadromous fish streams, some along any fish streams, and others along all streams with or without fish). There is the opportunity to allocate all, or selected, streamside areas to allow no timber harvest.

Increases in fish production would result from maintaining currently existing habitat, combined with rehabilitation of previously impacted areas and the development of fish enhancement projects. In addition, a preliminary listing of potential fish enhancement projects has been made. Table 3-21 displays these preliminary opportunities by Administrative Area of the Tongass.

TABLE 3-21
POTENTIAL THOUSAND OF POUNDS OF SALMON RESULTING FROM FIRST DECADE FISH ENHANCEMENT[1] (thousands of pounds)

Decade	*Ketchikan*	*Stikine*	*Chatham*	*Total*
1	3,715	923	2,214	6,852
2	13,536	3,091	2,248	18,876
3	14,194	3,091	2,063	19,348
4	9,709	3,020	1,807	14,536
5	9,303	1,787	752	11,841

Source: List of potential projects developed by the Administrative Area Fish Biologists, 1988-1989.
[1]Thousands of pounds available for commercial harvest. The fish may also be harvested in the subsistence or sport fisheries.

Table 3-21 indicates that approximately 6.5 million pounds of salmon enhancement could be feasible during the first ten years of implementation of the Revised Tongass Land Management Plan. Salmon are available to the subsistence, commercial and sport fisheries. Typically, full project capability takes from 5-20 years to be achieved, depending on the type of project. Therefore, the maximum benefit of the projects implemented in the first ten years is actually attained in the third decade. Approximately 19 million pounds of salmon enhancement, available to the commercial fishery, should be available in the third decade.

A number of caveats are attached to these estimates: 1) although these are the current best estimates, most of the projects will require ground verification; 2) the projects will have to be cleared through a site-specific environmental analysis; 3) some projects may be better classified as rehabilitation rather than enhancement; and 4) only theoretically are these numbers of fish available to the commercial fishery -- there are many other factors limiting the actual harvest, such as off-shore survival.

The identified projects include proposals for enhancement in wilderness areas. The construction of projects in wilderness, although specifically allowed in Section 1315 of ANILCA, has been controversial. Forest Service direction is that comparable projects should be implemented outside of wilderness rather than within wilderness. These projects will receive further review prior to the completion of the Final Revised Plan, and their implementation.

FISH

ENVIRONMENTAL CONSEQUENCES

The National Forest Management Act sets the minimum standard for fish habitat maintenance on the National Forests. In part, the Act states (36 CFR 219.27(e)):

> "No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas (riparian areas) which seriously and adversely affect water conditions or fish habitat." (parenthetical words added)

In essence, the National Forest Management Act requires that no serious and adverse effect occurs to fish habitat.

The standard set for the Tongass National Forest in the Tongass Land Management Plan (USDA Forest Service, 1979, p. 92) is to, "preserve the biological productivity of every fish stream on the Tongass." For this revision of the Tongass Land Management Plan, the goal of preserving the biological productivity of fish streams on the Tongass is a common goal of all of the alternatives.

The following sections describe the strategies to attain this goal and an evaluation of the effects of the alternatives. Included in these sections are: 1) the results of modeling the effects of management activities and, 2) a comparison and discussion of risk associated with the implementation of each of the alternatives, 3) habitat enhancement levels anticipated for the plan, and 4) mitigation to be applied to protect fish habitat. Taken together, these sections describe the potential cumulative effects of the proposed activities on the fish resources of the Tongass National Forest.

DIRECT & INDIRECT EFFECTS

Fish habitat capability and stream productivity interact with many of the resource management activities on the Tongass National Forest. The activities that generally have the greatest potential effect on the fish resources are timber harvest, roads, and fish habitat enhancement projects. Mineral activities, recreation use and fire may have an effect on fish, but generally these effects are limited in scope on a Forest-wide basis.

Every alternative, A through G, maintains the goal of the current Tongass Land Management Plan: "to preserve the biological productivity of every fish stream on the Tongass." In order to attain this goal, activities which include the maintenance or enhancement of fish habitat capability of streams are appropriate.

Riparian Management Area Prescriptions. A riparian management area prescription is applied, along all perennial streams and riparian areas where the Timber Production, Scenic Viewshed, Roaded-Natural or Visual-Timber management area prescription would normally be applied. In other areas, such as the Primitive Recreation management area, where management is normally less potentially impacting than could occur in a riparian management area, a riparian management prescription would not apply.

Two riparian management area prescriptions were developed for the Forest Plan: 1) Fish Habitat and Water Quality Requirements, and 2) Stream and Lake Protection. The complete prescriptions are located in Appendix F. The boundaries of the riparian area are identified in Appendix B (management requirements). The objective of the Fish Habitat and Water Quality Requirements management area is to comply with the National Forest Management Act Regulations of no serious and adverse effects to water quality and fish habitat, while the objective of the Stream and Lake Protection management area is to maintain or enhance aquatic biological productivity.

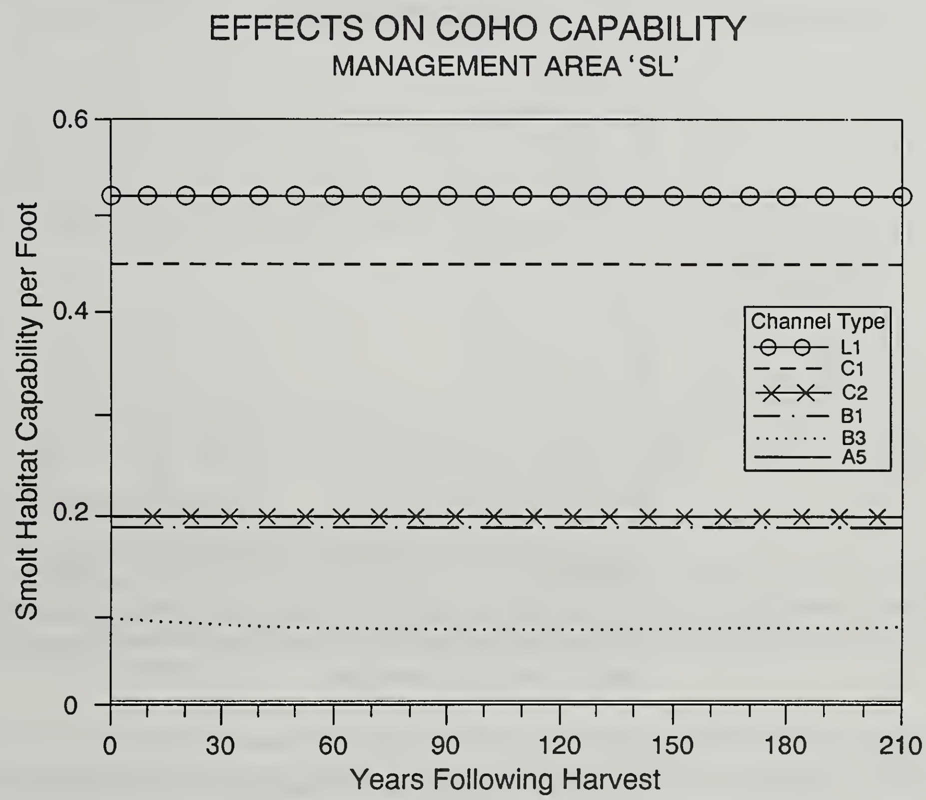
All alternatives, A through G, have included only the Stream and Lake Protection management area prescription for implementation. The rationale for this is that the Stream and Lake Protection management area prescription best meets current direction and public issues. The objective of the Fish Habitat and Water Quality Requirements prescription, which calls for no serious and adverse effect to water quality and fish habitat, is a lesser objective than what is specified in the Stream and Lake Protection prescription. No public issue was raised to reduce the protection presently given to fish habitat on the Tongass.

Timber harvest. Timber harvest has potential positive and negative effects on fish habitat capability. Timber harvest may affect the sources of large woody debris, stream stability and water quality (covered in the watershed section of this chapter). Timber harvest, under some circumstances, may have a positive effect on fish by increasing the amount of primary productivity in a stream system. However, these potential positive effects, which are generally only seasonal in nature, are not quantified in this assessment. Also, timber harvest may fund habitat enhancement projects through Knudson-Vandenburg (K-V) funds. K-V funds are made available from timber sale receipts and can be used for the enhancement of non-timber resources.

The effects on coho and Dolly Varden resulting from the implementation of the Stream and Lake Protection management area prescription are used in estimating the effects of implementation of all alternatives proposed in this Draft Environmental Impact Statement. The estimated effect on coho and Dolly Varden habitat capability following timber harvest is shown for sample channel types in Figures 3-14 through 3-16. Capability changes for Dolly Varden are shown for both Class I and Class II streams, since they would be differently managed. (Coho

are only found in Class I streams.) Model calculations were performed as described in the Affected Environment portion of this fish section, and in Appendix B. Figures which show the comparison to past management activities are also located in the Affected Environment portion of this fish section (Figures 3-7 to 3-11).

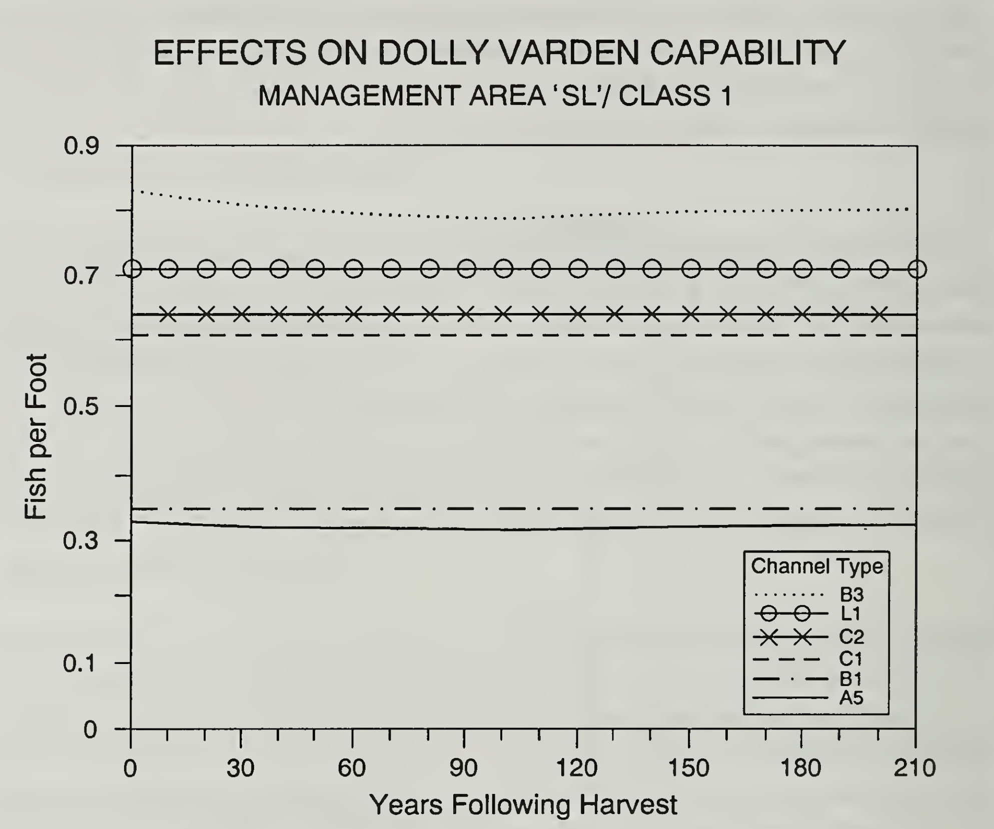
FIGURE 3-14 [1]



Source: Coho Habitat Capability Model (Appendix B)

[1]Outputs are in smolts per foot of stream channel (for each channel type). This model is used to estimate the effects of implementation of Management Area Prescription 'SL.' This prescription would be implemented in all alternatives.

FIGURE 3-15 [1]

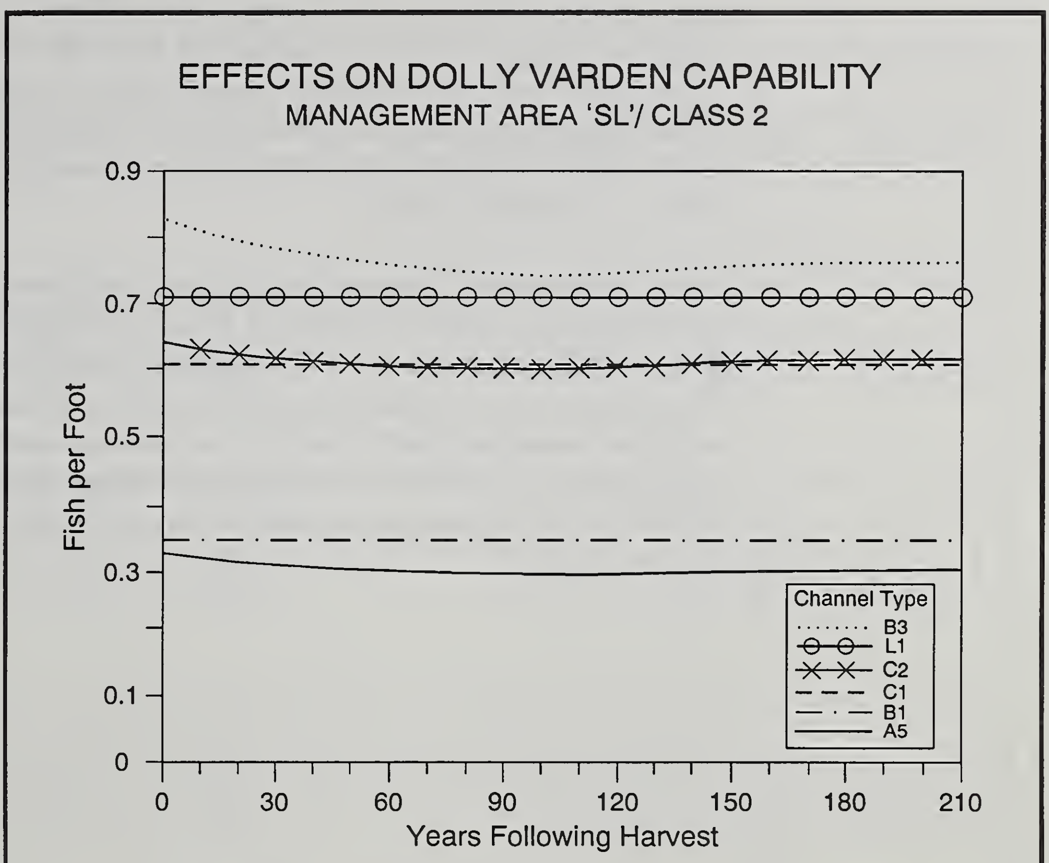


Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model is used to estimate the effects of implementation of Management Area Prescription 'SL.' This prescription would be implemented in all alternatives.

Implementation of the Stream and Lake Protection management area prescription is estimated to reduce habitat capability Forest-wide due to timber harvest by a maximum of 1/2 of 1 percent during the next 150 years for coho salmon, and for Dolly Varden char by less than three percent during the next 150 years if all forested (tentatively suitable) riparian areas, outside of wilderness, were harvested according to the direction and standards & guidelines. In fact, this is an overestimation of the amount of reduced capability since all riparian acres are not allocated to the Stream and Lake Protection prescription or any other prescription allowing scheduled timber harvest.

FIGURE 3-16 [1]



Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]**Outputs are in fish per foot of stream channel (for each channel type). This model is used to estimate the effects of implementation of Management Area Prescription 'SL.' This prescription would be implemented in all alternatives.**

Effects on pink salmon were discussed in the previous section on "pink salmon" in the Affected Environment. In that section, no quantitative reductions in pink salmon habitat capability were predicted due to management activities. With implementation of any of the alternatives, no quantitative reductions are predicted either. However, with increased developmental activities, there is added risk of effects to pink salmon habitat capability. These effects are described in the following section.

Although none of the alternatives are anticipated to significantly, or measurably, affect fish habitat capability, there is a risk of unplanned stream-habitat impacts occurring. This risk is associated with the amount of timber harvest, rate of harvest and location of harvest within a watershed. Failure to implement all aspects of Forest Pian direction which maintain fish habitat contributes to the risk from timber harvest.

Table 3-22 and Table 3-23 indicate the potential risk to the fish resource from timber harvest. The number of acres of Stream and Lake Protection management area, which potentially could be harvested, is shown in Table 3-22 for each geozone. Shown also is the percentage of the entire geozone that is included in the Stream and Lake Protection management area. With a higher percentage of the geozone potentially harvested, there is a higher risk of unplanned impacts to fish habitat capability and overall greater potential for cumulative watershed effects reducing fish habitat.

Table 3-23 compares the number of acres of tentatively suitable riparian acres in each geozone, with the number of acres of available timber allocated in the Stream and Lake Protection management area. This table shows, by percentages, the potential acres of riparian areas that could have harvest activities. It is important to note that many acres in the Stream and Lake Protection management area, although classified as suitable timber, will not be subject to timber harvest, as directed in the management prescription in Appendix F.

TABLE 3-22
ACRES IN STREAM AND LAKE PROTECTION MANAGEMENT AREA PRESCRIPTION BY ALTERNATIVE AND GEOZONE, INCLUDING PERCENTAGE OF GEOZONE IN THE PRESCRIPTION

		Alt A		*Alt B*		*Alt C*		*Alt D*		*Alt E*		*Alt F*		*Alt G*	
Geozone	*Total Acres*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*
C01	176,137	120	(0.1)	40	(0.0)	2,281	(1.3)	1,401	(0.8)	1,160	(0.7)	740	(0.4)	960	(0.5)
C02	354,207	2,040	(0.6)	2,600	(0.7)	19,428	(5.5)	11,003	(3.1)	16,204	(4.6)	19,428	(5.5)	18,506	(5.2)
C03	65,926	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C04	41,029	440	(1.1)	500	(1.2)	2,899	(7.1)	1,800	(4.4)	2,899	(7.1)	2,899	(7.1)	2,899	(7.1)
C05	120,013	0	(0)	639	(0.5)	7,232	(6.0)	6,172	(5.1)	0	(0)	4,275	(3.6)	6,672	(5.6)
C06	372,719	3,254	(0.9)	3,653	(1.0)	19,791	(5.3)	17,916	(4.8)	13,298	(3.6)	14,896	(4.0)	17,954	(4.8)
C07	12,239	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C09	294,733	1,922	(0.7)	1,922	(0.7)	6,705	(2.3)	6,405	(2.2)	6,705	(2.3)	6,705	(2.3)	6,705	(2.3)
C10	431,918	2,763	(0.6)	2,823	(0.7)	10,269	(2.4)	8,889	(2.1)	10,269	(2.4)	10,269	(2.4)	10,269	(2.4)
C11	126,120	0	(0)	0	(0)	0	(0)	1,121	(0.9)	0	(0)	0	(0)	0	(0)
C12	207,772	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C13	315,736	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C14	650,103	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C15	964,282	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C16	98,070	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C17	349,134	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C18	217,530	2,018	(0.9)	2,018	(0.9)	5,316	(2.4)	5,453	(2.5)	5,316	(2.4)	5,316	(2.4)	5,316	(2.4)
C20	86,742	200	(0.2)	200	(0.2)	2,522	(2.9)	881	(1.0)	1,601	(1.8)	1,601	(1.8)	1,340	(1.5)
C21	182,721	779	(0.4)	998	(0.5)	3,135	(1.7)	2,336	(1.3)	2,656	(1.5)	2,656	(1.5)	2,676	(1.5)
C22	719,339	0	(0)	0	(0)	6,267	(0.9)	1,815	(0.3)	0	(0)	0	(0)	20	(0.0)
C23	1,970,942	1,656	(0.1)	1,696	(0.1)	7,542	(0.4)	6,420	(0.3)	7,542	(0.4)	7,542	(0.4)	7,542	(0.4)
C24	159,485	0	(0)	0	(0)	2,361	(1.5)	2,201	(1.4)	2,361	(1.5)	2,361	(1.5)	2,361	(1.5)
C25	240,716	1,531	(0.6)	2,894	(1.2)	11,246	(4.7)	8,402	(3.5)	2,754	(1.1)	7,603	(3.2)	10,065	(4.2)
K01	130,025	0	(0)	0	(0)	1,400	(1.1)	920	(0.7)	1,400	(1.1)	1,400	(1.1)	1,400	(1.1)
K02	46,785	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
K04	491,445	6,623	(1.3)	8,243	(1.7)	17,624	(3.6)	17,964	(3.7)	17,624	(3.6)	17,624	(3.6)	17,624	(3.6)
K05	193,473	2,801	(1.4)	2,881	(1.5)	12,601	(6.5)	6,183	(3.2)	12,601	(6.5)	12,601	(6.5)	12,601	(6.5)
K06	709,615	13,288	(1.9)	13,206	(1.9)	39,576	(5.6)	40,573	(5.7)	39,576	(5.6)	39,576	(5.6)	39,576	(5.6)
K07	279,242	3,362	(1.2)	3,623	(1.3)	10,832	(3.9)	11,133	(4.0)	10,832	(3.9)	10,832	(3.9)	10,832	(3.9)

TABLE 3-22 (continued)
ACRES IN STREAM AND LAKE PROTECTION MANAGEMENT AREA PRESCRIPTION BY ALTERNATIVE AND GEOZONE, INCLUDING PERCENTAGE OF GEOZONE IN THE PRESCRIPTION

		Alt A		*Alt B*		*Alt C*		*Alt D*		*Alt E*		*Alt F*		*Alt G*	
Geozone	*Total Acres*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*
K08	399,683	7,034	(1.8)	7,794	(2.0)	19,526	(4.9)	15,670	(3.9)	16,766	(4.2)	18,146	(4.5)	19,166	(4.8)
K09	141,794	2,877	(2.0)	2,877	(2.0)	7,755	(5.5)	6,472	(4.6)	7,755	(5.5)	7,755	(5.5)	7,755	(5.5)
K10	102,921	0	(0)	40	(0.0)	4,433	(4.3)	3,649	(3.5)	0	(0)	381	(0.4)	381	(0.4)
K11	224,209	3,150	(1.4)	3,290	(1.5)	10,893	(4.9)	10,753	(4.8)	7,119	(3.2)	7,119	(3.2)	9,668	(4.3)
K12	107,882	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
K13	2,295,198	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
K14	87,567	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
K15	35,123	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
S01	302,218	5,975	(2.0)	6,954	(2.3)	12,590	(4.2)	13,824	(4.6)	10,913	(3.6)	12,550	(4.2)	12,550	(4.2)
S02	124,065	0	(0)	2,546	(2.1)	4,029	(3.2)	3,989	(3.2)	0	(0)	4,029	(3.2)	4,029	(3.2)
S03	314,024	3,237	(1.0)	3,955	(1.3)	8,305	(2.6)	8,205	(2.6)	7,666	(2.4)	8,305	(2.6)	8,305	(2.6)
S04	115,283	1,921	(1.7)	2,101	(1.8)	4,102	(3.6)	3,803	(3.3)	4,102	(3.6)	4,102	(3.6)	4,102	(3.6)
S05	117,584	3,915	(3.3)	3,915	(3.3)	5,952	(5.1)	5,892	(5.0)	5,952	(5.1)	5,952	(5.1)	5,952	(5.1)
S06	235,054	2,944	(1.3)	3,305	(1.4)	5,427	(2.3)	6,762	(2.9)	5,427	(2.3)	5,427	(2.3)	5,427	(2.3)
S07	119,543	2,100	(1.8)	2,100	(1.8)	3,960	(3.3)	3,460	(2.9)	3,960	(3.3)	3,960	(3.3)	3,960	(3.3)
S08	611,468	2,099	(0.3)	2,439	(0.4)	4,743	(0.8)	6,895	(1.1)	4,743	(0.8)	4,743	(0.8)	4,743	(0.8)
S09	764,566	2,260	(0.3)	2,380	(0.3)	9,939	(1.3)	7,661	(1.0)	9,939	(1.3)	9,939	(1.3)	9,939	(1.3)
S10	287,266	1,526	(0.5)	2,666	(0.9)	6,654	(2.3)	6,613	(2.3)	3,833	(1.3)	6,654	(2.3)	6,654	(2.3)
S11	67,540	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
S12	448,703	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
S13	47,815	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
S14	44,043	640	(1.5)	640	(1.5)	1,382	(3.1)	941	(2.1)	1,382	(3.1)	1,382	(3.1)	1,382	(3.1)
TOTALS	17,001,747	82,475	(0.5)	94,938	(0.6)	298,717	(1.8)	263,577	(1.6)	244,355	(1.4)	268,768	(1.6)	279,331	(1.6)

Source: Revision Database Query Q235L, March 1990.

TABLE 3-23

ACRES OF AVAILABLE TIMBER IN THE STREAM AND LAKE MANAGEMENT AREA, WITH PERCENTAGE COMPARISON TO ACRES OF RIPARIAN TENTATIVELY SUITABLE[1]

Geozone	Riparian Acres	Alt A Acres	Alt A %	Alt B Acres	Alt B %	Alt C Acres	Alt C %	Alt D Acres	Alt D %	Alt E Acres	Alt E %	Alt F Acres	Alt F %	Alt G Acres	Alt G %
C01	4,423	120	(3)	40	(1)	2,281	(52)	1,401	(32)	1,160	(26)	740	(17)	960	(22)
C02	21,129	2,040	(10)	2,600	(12)	19,428	(92)	11,003	(52)	16,204	(77)	19,428	(92)	18,506	(88)
C04	2,999	440	(15)	500	(17)	2,899	(97)	1,800	(60)	2,899	(97)	2,899	(97)	2,899	(97)
C05	7,551	0	(0)	639	(8)	7,232	(96)	6,172	(82)	0	(0)	4,275	(57)	6,672	(88)
C06	22,590	3,254	(14)	3,653	(16)	19,791	(88)	17,916	(79)	13,298	(59)	14,896	(66)	17,954	(79)
C07	200	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
C09	8,567	1,922	(22)	1,922	(22)	6,705	(78)	6,405	(75)	6,705	(78)	6,705	(78)	6,705	(78)
C10	13,013	2,763	(21)	2,823	(22)	10,269	(79)	8,889	(68)	10,269	(79)	10,269	(79)	10,269	(79)
C11	1,782	0	(0)	0	(0)	0	(0)	1,121	(63)	0	(0)	0	(0)	0	(0)
C18	6,988	2,018	(29)	2,018	(29)	5,316	(76)	5,453	(78)	5,316	(76)	5,316	(76)	5,316	(76)
C20	2,722	200	(7)	200	(7)	2,522	(93)	881	(32)	1,601	(59)	1,601	(59)	1,340	(49)
C21	6,615	779	(12)	998	(15)	3,135	(47)	2,336	(35)	2,656	(40)	2,656	(40)	2,676	(40)
C22	7,128	0	(0)	0	(0)	6,267	(88)	1,815	(25)	0	(0)	0	(0)	20	(0)
C23	17,112	1,656	(10)	1,696	(10)	7,542	(44)	6,420	(38)	7,542	(44)	7,542	(44)	7,542	(44)
C24	7,641	0	(0)	0	(0)	2,361	(31)	2,201	(29)	2,361	(31)	2,361	(31)	2,361	(31)
C25	12,328	1,531	(12)	2,894	(23)	11,246	(91)	8,402	(68)	2,754	(22)	7,603	(62)	10,065	(82)
K01	2,200	0	(0)	0	(0)	1,400	(64)	920	(42)	1,400	(64)	1,400	(64)	1,400	(64)
K02	583	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
K04	22,811	6,623	(29)	8,243	(36)	17,624	(77)	17,964	(79)	17,624	(77)	17,624	(77)	17,624	(77)
K05	12,881	2,801	(22)	2,881	(22)	12,601	(98)	6,183	(48)	12,601	(98)	12,601	(98)	12,601	(98)
K06	43,874	13,288	(30)	13,206	(30)	39,576	(90)	40,573	(92)	39,576	(90)	39,576	(90)	39,576	(90)
K07	12,374	3,362	(27)	3,623	(29)	10,832	(88)	11,133	(90)	10,832	(88)	10,832	(88)	10,832	(88)
K08	20,086	7,034	(35)	7,794	(39)	19,526	(97)	15,670	(78)	16,766	(83)	18,146	(90)	19,166	(95)
K09	7,955	2,877	(36)	2,877	(36)	7,755	(97)	6,472	(81)	7,755	(97)	7,755	(97)	7,755	(97)
K10	4,433	0	(0)	40	(1)	4,433	(0)	3,649	(82)	0	(0)	381	(9)	381	(9)
K11	10,933	3,150	(29)	3,290	(30)	10,893	(0)	10,753	(98)	7,119	(65)	7,119	(65)	9,668	(88)
K12	3,404	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
S01	15,662	5,975	(38)	6,954	(44)	12,590	(80)	13,824	(88)	10,913	(70)	12,550	(80)	12,550	(80)
S02	4,731	0	(0)	2,546	(54)	4,029	(85)	3,989	(84)	0	(0)	4,029	(85)	4,029	(85)
S03	8,903	3,237	(36)	3,955	(44)	8,305	(93)	8,205	(92)	7,666	(86)	8,305	(93)	8,305	(93)
S04	4,263	1,921	(45)	2,101	(49)	4,102	(96)	3,803	(89)	4,102	(96)	4,102	(96)	4,102	(96)
S05	6,112	3,915	(64)	3,915	(64)	5,952	(97)	5,892	(96)	5,952	(97)	5,952	(97)	5,952	(97)
S06	7,784	2,944	(38)	3,305	(42)	5,427	(70)	6,762	(87)	5,427	(70)	5,427	(70)	5,427	(70)
S07	4,000	2,100	(53)	2,100	(53)	3,960	(99)	3,460	(87)	3,960	(99)	3,960	(99)	3,960	(99)
S08	9,661	2,099	(22)	2,439	(25)	4,743	(49)	6,895	(71)	4,743	(49)	4,743	(49)	4,743	(49)
S09	16,157	2,260	(14)	2,380	(15)	9,939	(62)	7,661	(47)	9,939	(62)	9,939	(62)	9,939	(62)
S10	7,173	1,526	(21)	2,666	(37)	6,654	(93)	6,613	(92)	3,833	(53)	6,654	(93)	6,654	(93)
S14	1,542	640	(42)	640	(42)	1,382	(90)	941	(61)	1,382	(90)	1,382	(90)	1,382	(90)
TOTALS	370,310	82,475	(22)	94,938	(26)	298,717	(81)	263,577	(71)	244,355	(66)	268,768	(73)	279,331	(75)

Sources: Revision Database Query Q235L, March 1990 & Query 235L4, April 1990.

[1]Does not include designated Wilderness.

Forest-wide, the most risk of impacts to stream habitats due to timber harvest activities is in Alternative C, followed by Alternatives G, F, D, E, B and A. By alternative, the geozones with the highest risk are shown in Table 3-24. Only geozones with over five percent of the entire geozone in the Stream and Lake Protection management area are shown.

TABLE 3-24
GEOZONES WITH MORE THAN 5 PERCENT IN STREAM & LAKE PROTECTION MANAGEMENT AREA

Alternatives	*Geozones*
A	None
B	None
C	C02,C04,C05,C06,K05,K06,K09,S05
D	C05,K06,S05
E	C04,K05,K06,K09,S05
F	C02,C04,K05,K06,K09
G	C02,C04,C05,K05,K06,K09,S05

Monitoring, required in all alternatives, should reduce the risk of effects on fish habitat due to timber harvest. During monitoring, an assessment is made of whether implementation is occurring as planned, and whether the effects of management direction are as anticipated. Activities, or standards and guidelines that do not meet the objective of maintaining or enhancing fish habitat, will then be modified.

Roads. Road construction and use are often the greatest potential sediment source of all land management disturbing activities, over both the short term and the long term. Improperly designed, constructed, or maintained road crossings of streams can block fish passage and increase sediment deposited in fish spawning areas. Roads constructed in riparian areas can constrict the floodplain and channel, resulting in changes in channel morphology and associated habitat. Roads also increase recreation access and fishing opportunities, but the increase in fishing pressure can result in potential over harvest of wild stocks of fish. Borrow pits, dug in conjunction with road construction, have provided additional fish rearing habitat in some areas of the Forest.

The section on water describes some of the anticipated effects of roads on water quality. Although no Forest-wide effects on fish habitat are anticipated due to the construction and use of roads, the risk associated with roads increases with a larger number of roads. Risks include the effects of unplanned impacts such as road failures, use of construction materials which break down at a

rapid rate, washout of culverts and bridges, and failure of culverts and bridges to pass fish even though the original design was for fish passage.

Table 3-25 shows the number of existing number roads in each geozone of the Tongass, as well as the number of roads that are anticipated to be constructed through the planning horizon (150 years). Although the roads may be constructed over the next 150 years, essentially all of the roads are anticipated to be completed in the next 50 years. Forest-wide the largest numbers of roads would potentially be constructed in Alternative D, followed by Alternatives C, B, F, G, E and A. Therefore, the alternatives with the greatest risk of unplanned impacts in descending order are D, C, B, F, G, E and A. Alternative D has approximately four times the number of currently existing roads, while Alternative A has about twice the number of existing roads.

Table 3-25 also shows that the number of roads in each geozone generally follows the Forest-wide trend. There are some exceptions, such as in geozone K04 (Ketchikan Area), where the number of road miles is greatest in Alternative B, followed by Alternative D. In geozone K04, all other alternatives would include no road construction. In all alternatives except D, the Ketchikan Administrative Area has more than twice the roads of either the Stikine or Chatham Administrative Areas.

Fish habitat enhancement. Enhancement is emphasized in all alternatives. An enhancement program, similar in magnitude to that of the past ten years, is proposed in all alternatives. A summary of past enhancement is included in Table 3-14 and in the estimated increases in production shown in Table 3-18.

Proposed numbers of projects, types and distribution between administrative areas for the first decade are shown in Table 3-26. The table is a listing of potential projects and represents an estimate of the fish habitat enhancement program level common to all alternatives. Most projects have not had project-specific ground truthing or been subject to site-specific environmental analysis. Some of the projects are designed to rehabilitate past management-related activities or in some cases natural events or conditions. It is the objective of all alternatives to maintain fish habitat at existing levels and to use habitat improvement projects to rehabilitate conditions created by past land management activities and to improve on present conditions.

TABLE 3-25
MILES OF EXISTING AND TOTAL ANTICIPATED ROADS, BY GEOZONE AND ALTERNATIVE [1]

Geo zone	*Existing Roads*	*Anticipated Total Roads by Alternative* A	B	C	D	E	F	G
C01	0	0	16	0	0	0	0	0
C02	137	145	405	461	405	145	589	585
C03	0	0	0	0	0	0	0	0
C04	17	21	49	73	57	21	73	73
C05	0	0	8	4	8	0	8	4
C06	113	121	65	285	385	121	293	301
C07	0	0	0	0	0	0	0	0
C09	55	55	111	107	111	55	107	107
C10	84	84	260	212	212	84	212	212
C11	18	18	18	18	38	18	18	18
C12	0	0	0	0	0	0	0	0
C13	0	0	0	0	0	0	0	0
C14	0	0	0	0	0	0	0	0
C15	0	0	0	0	0	0	0	0
C16	0	0	0	0	0	0	0	0
C17	0	0	0	0	0	0	0	0
C18	33	41	213	61	157	33	109	109
C20	0	20	44	116	72	56	108	72
C21	1	5	173	57	65	1	57	53
C22	17	17	17	65	101	17	25	17
C23	0	0	156	0	16	0	0	0
C24	52	76	144	124	156	116	124	124
C25	1	13	253	425	253	13	341	409
Chatham	**528**	**616**	**2,332**	**2,008**	**2,036**	**680**	**2,064**	**2,084**
K01	31	31	31	107	63	107	107	107
K02	0	0	0	0	0	0	0	0
K04	283	283	1,375	283	603	283	283	283
K05	0	0	308	120	176	0	188	108
K06	877	1,621	2,021	2,053	2,357	1,917	2,061	2,017
K07	3	219	419	495	555	471	495	495
K08	171	371	635	835	735	591	791	791
K09	7	39	339	319	339	39	319	319
K10	0	0	56	212	148	0	36	24
K11	407	675	763	955	959	807	807	915
K12	0	0	0	0	0	0	0	0
K13	13	13	13	13	13	13	13	13
K14	0	0	0	0	0	0	0	0
K15	0	0	0	0	0	0	0	0
Ketchikan:	**1,792**	**3,252**	**5,960**	**5,392**	**5,948**	**4,228**	**5,100**	**5,072**
S01	157	473	545	693	909	497	617	621
S02	0	0	72	164	296	0	136	136
S03	125	149	145	277	613	145	145	145
S04	123	235	247	283	375	247	195	195
S05	105	221	221	229	237	229	229	229
S06	35	111	119	283	467	227	227	227
S07	67	123	115	151	295	79	79	79
S08	21	105	133	261	317	249	249	249
S09	0	64	68	276	320	244	244	244
S10	0	0	0	28	192	0	0	0
S11	0	0	0	0	0	0	0	0
S12	0	0	0	0	0	0	0	0
S13	0	0	0	0	0	0	0	0
S14	13	45	69	73	65	45	65	65
Stikine:	**646**	**1,526**	**1,734**	**2,718**	**4,086**	**1,962**	**2,186**	**2,190**
TOTAL	**2,966**	**5,394**	**10,026**	**10,118**	**12,070**	**6,870**	**9,350**	**9,346**

[1]The planning horizon is 150 years, however all roads are anticipated to be constructed in approximately the first 50 years.
(Source: FORPLAN outputs for roads constructed and GIS for existing roads)

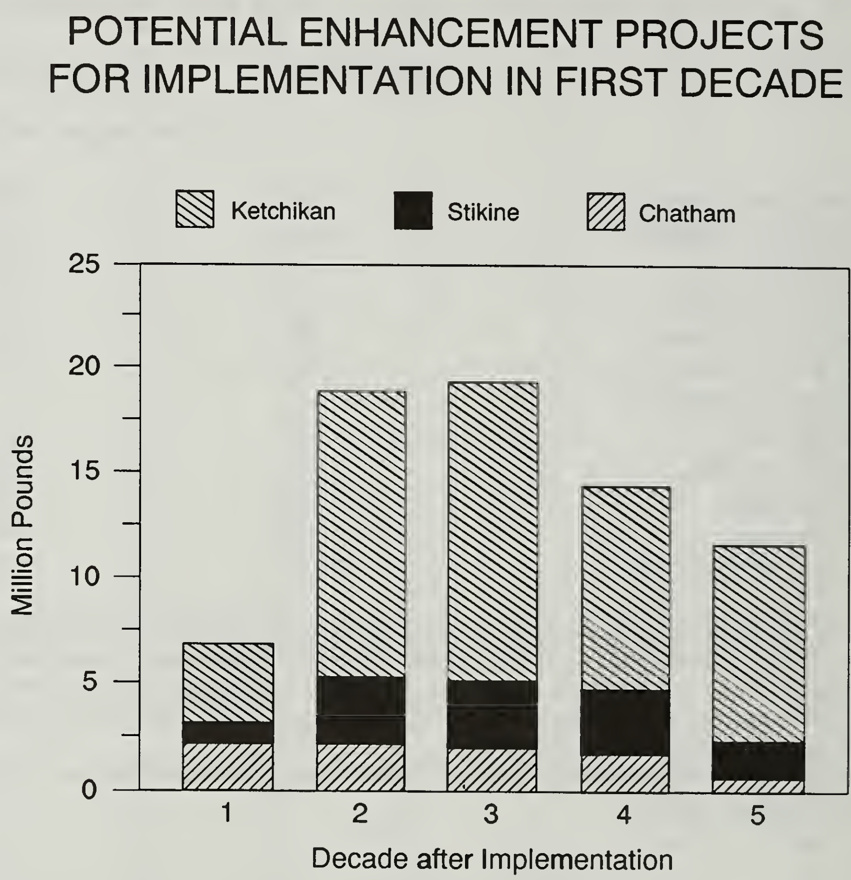
TABLE 3-26
NUMBER OF ENHANCEMENT PROJECTS BY TYPE AND LOCATION FOR THE FIRST DECADE[1]

Project Type	*Chatham Area*	*Stikine Area*	*Ketchikan Area*	*Total*
		(one year projects/multiple year projects)[2]		
Small instream structural[3]	10/1	0/3	22/1	32/5
Structural fish passage	15/0	8/0	26/0	49/0
Falls modification	4/0	0/0	2/0	6/0
Spawning channels	1/0	0/0	1/0	2/0
Rearing ponds/streams	2/1	1/0	1/0	4/1
Barren lake stocking	0/3	0/0	0/0	0/3
Coop. fish stocking (not a barren lake)	1/4	0/0	1/3	2/7
Incubation boxes	1/1	2/0	0/0	3/1
Lake fertilization	0/2	0/0	0/3	0/5
Debris removal	1/0	0/0	0/0	1/0
TOTAL PROJECTS	35/12	11/3	53/7	99/22

Source: List of potential projects developed by Administrative Area Fish Biologists, 1988-1989.
[1]This table lists potential projects. Most have not been through project-specific ground truthing or National Environmental Policy Act (NEPA) analysis. Some of the projects (the majority listed in [3]) may be considered rehabilitation rather than enhancement.
[2]Some projects are completely implemented in a one-year period, while others may be recurring for a number of years. For instance, lake fertilization is always a multi-year project.
[3]The majority of the small instream structural projects, which includes projects such as large woody debris and gabion placement, mitigate past logging activities.

The benefits, in terms of pounds of commercially harvested salmon which could accrue from these projects, is shown in Figure 3-17 (see also Table 3-21). As shown in the illustration, projects constructed during the first ten years of Forest Plan implementation will provide benefits for at least 50 years. Typically, full project capability takes from 5-20 years to be achieved, depending on the type of project.

FIGURE 3-17



Source: Planning Records (List of Potential Enhancement Projects)

Figure 3-17 shows that an annual average of approximately 6.5 million pounds of salmon enhancement available to the commercial fishery may be feasible during the ten year period following implementation. Twelve million pounds of enhancement are anticipated by the end of the first decade, and 19 million pounds of salmon should be available by the third decade. Only theoretically are these numbers of fish available to the fisheries; there are many other factors limiting the actual harvest, such as off-shore survival and high-seas interception. Although fish harvest is shown in terms of pounds harvestable to the commercial fishery, the fish would also be available to, and harvested by, subsistence and sportfish users. The distribution of these fish between the different user groups is set by the Alaska State Board of Fisheries, in cooperation with the Alaska Department of Fish and Game.

The identified projects include proposals for enhancement in Wilderness. The Wilderness Act states that Wilderness is "managed so as to preserve its natural conditions," and precludes most fish enhancement activities. However, ANILCA Section 1315 modifies the Wilderness Act and specifically allows aquaculture in Wilderness, but requires that facilities "shall be constructed, managed, and operated in a manner that minimizes adverse impacts on the wilderness character

of the area." The enhancement represented in Figure 3-17 includes 22 projects in Wilderness which would require structural development (fishways, barrier modification, incubator boxes or lake fertilization projects).

Current Forest Service direction is that comparable projects identified outside of Wilderness should be implemented first, prior to implementing projects within Wilderness. In order to attain the goals of the Salmon Enhancement Plans (discussed in the demand section of the affected environment), all inventoried projects, both outside and within Wilderness are anticipated to be necessary during the next decade. Other projects outside of Wilderness, which could be substituted for projects within Wilderness may exist, but these have not been identified. Although all identified projects are anticipated to be necessary to meet the Salmon Enhancement goals, individual projects are still subject to site-specific environmental analysis and public comment prior to the final decision to implement the project. Direction and standards & guidelines for habitat enhancement in the Wilderness management areas (WW and WM) are located in Appendix F.

CUMULATIVE EFFECTS

The sections on timber, roads and enhancement displayed the anticipated effects of the alternatives on Management Indicator Species (MIS) that are quantified (such as habitat enhancement), as well as the effects of the alternatives that are not directly quantified (such as risk). Table 3-27 shows the cumulative anticipated quantified fish outputs of the alternatives, in terms of fish habitat capability. Habitat capability for pink and coho salmon are measured in numbers of smolts (juvenile fish which migrate to the sea), and for Dolly Varden char in numbers of fish. The habitat capability does not differ significantly between alternatives.

Table 3-27 shows the anticipated habitat capability and percent change with, and without, the benefits of fish habitat enhancement. The table shows that the major enhancement emphasis is on coho salmon (up to a 47 percent increase) while most of the net reduction in habitat capability (up to 2.8 percent) is expected for Dolly Varden char. The reductions are primarily due to the long-term effects of past harvest practices.

In some columns, a range in capability is shown. The range indicates the effects of implementation of the Stream and Lake Protection management area prescription if applied on all tentatively suitable forested acres versus the effects of application on no acres of tentatively suitable forested acres. All alternatives will fall within this range.

TABLE 3-27
PERCENT OF 1954 FISH MIS HABITAT CAPABILITY FOR ALL ALTERNATIVES
(Including designated Wilderness)

With Enhancement Projects in the First Decade

Management Indicator/Year	*Millions of Fish Produced*	*% Change from 1954*
Pink Salmon		
Year 1954	2,394 smolts	
Year 1988	2,454 smolts	+ 2.5%
Year 2000	2,537 smolts	+ 6.0%
Year 2150	2,513 smolts	+ 5.0%
Coho Salmon		
Year 1954	19.1 smolts	
Year 1988	19.1 smolts	No Change
Year 2000	Up to 23.9 smolts	+ 25%
Year 2150	Up to 28.2 smolts	+ 47%
Dolly Varden		
Year 1954	67.9 fish	
Year 1988	67.4 fish	- 0.7%
Year 2000	67.0 to 67.3 fish	- 1.0% to - 1.3%
Year 2150	66.0 to 67.0 fish	- 1.4% to - 2.8%

Without Enhancement Projects

Management Indicator/Year	*Millions of Fish Produced*	*% Change from 1954*
Pink Salmon		
Year 1954	2,394 smolts	
Year 1988	2,454 smolts	+ 2.5%
Year 2000	2,454 smolts	+ 2.5%
Year 2150	2,454 smolts	+ 2.5%
Coho Salmon		
Year 1954	19.1 smolts	
Year 1988	19.1 smolts	No Change
Year 2000	19.1 smolts	No Change
Year 2150	19.0 smolts	- 0.5%
Dolly Varden		
Year 1954	67.9 fish	
Year 1988	67.4 fish	- 0.7%
Year 2000	67.0 to 67.3 fish	- 1.0% to - 1.3%
Year 2150	66.0 to 67.0 fish	- 1.4% to - 2.8%

Source: Habitat Capability Models (see Appendix B)

In all alternatives, viable populations of fish will be maintained, distributed across the Forest in a very similar pattern to the current situation. The maximum reduction in Forest-wide capability could approach 2.8 percent (from the natural stream-habitat capability) for Dolly Varden char. The tables in this fish section indicate that in some of the geozones the reduction could be greater, but with the goal in all alternatives to maintain or enhance fish populations, in no geozone will viability of the management indicator species become a concern.

Three specific fish populations have been designated as Regional Forester's sensitive species. Unlike the management indicator species which are widely distributed across the Forest, each of these populations have very limited distribution. The species are the pike in Pike Lakes at Yakutat, a large type of chum salmon near Hyder, and island runs of king salmon in King Salmon River and Wheeler Creek on Admiralty Island. Potential effects of the alternatives on the viability of these species are considered in the section on Threatened, Endangered and Sensitive Species.

ANILCA 507(b) requires the submittal of a report to the U.S. Congress on the status of cooperative fish planning on the Tongass, a description of current hatchery and aquaculture projects with an analysis of the success of these projects, and a prioritized list of projects anticipated for the duration of the management plan. This report expands upon some of the information in this fish section, and also summarizes additional information concerning past and proposed enhancement projects. A discussion of the cooperative fish planning process is also included in the report.

Other Plans and Legislation

Legislation is currently proposed in the U.S. Congress and legislation has recently been signed into law by the Alaska State Governor that directly affects riparian areas and fish resources.

The U.S. Congress is considering two proposals (March 1990), both of which provide at least a 100-ft "no harvest" area on both sides of all anadromous (Class 1) fish streams. The House bill (H.R. 987) also includes 100 feet on significant tributaries (Class 2 and 3), while the Senate committee bill includes no harvest area on Class 1's and on Class 2 streams 300 feet upstream of Class 1 streams. The Senate is currently considering amendments to the committee bill (May 1990).

Both proposals in Congress are more restrictive to timber harvest than the direction and standards & guidelines provided in the Stream and Lake Protection management area prescription. The Stream and Lake Protection management area allows timber harvest closer than 100 feet on streams with low fish productivity or streams in which large woody debris is not a key component of

the fish habitat. Fish habitat capability modeling has shown that capability for coho salmon would decrease a maximum of one-half of one percent from the current capability, in the longterm, with application of the Stream and Lake Protection management area prescription along all forested (tentatively suitable) streams. With application of either proposed Congressional bill, modeling indicates there would likely be no habitat capability reduction.

A comparison of the Stream and Lake Protection Management Area Prescription and the National Marine Fisheries Service policy for riparian habitat protection in Alaska is included as Appendix O. The National Marine Fisheries Service policy closely resembles the House bill, H.R. 987.

The State of Alaska has recently enacted into law changes to their State Forest Practices Act (May, 1990). Prior to adopting the revisions of the Forest Practices Act, there was essentially no restriction of timber harvest in the riparian area. The revisions to the Forest Practices Act include different standards for private and State lands. For private lands, there would be a no harvest area within 66 feet of anadromous fish streams, while on State lands the no harvest area would range between 100 and 300 feet. Fish habitat capability models estimate that implementation of the standards for private lands would result in small decreases in capability, while the standards for State lands would maintain habitat capability.

Effects on Other Resources

Fish habitat, and its maintenance and enhancement, may complement or conflict with the production or capability of other resources. This section lists some of these potential interactions not covered in previous sections.

Cultural resources. Occasionally the location of fish habitat enhancement projects may coincide with the location of cultural resource sites. This may occur because early Alaskans and native people fished at sites that had high fish production or at waterfalls with fish barriers. Development of fish projects requires careful cultural reconnaissance to avoid any conflicts between the resources. Implementation of the Forest-wide direction and standards & guidelines (Appendix G) for cultural resources should result in no negative effects to the cultural resources. The effect of fisheries on cultural resources is not expected to change by alternative.

Recreation. Maintenance and enhancement of fish resources generally has a complementary benefit on recreation. The effects of fisheries on recreation are not expected to change by alternative.

Visuals. Maintenance and enhancement of fish resources generally complements visual management, since timbered areas are left along streams during timber harvest primarily to maintain fish habitat capability. These timbered areas usually

enhance the visual condition. Enhancement of fisheries in visually sensitive areas may lead to a reduction in visual quality where man-made structures are constructed. However, most of the time, fish habitat enhancement projects can be constructed in a manner that will meet the allocated visual quality objective. Those alternatives with a Retention visual quality standard could have greater inherent conflict between visuals and fish. (See the section in this chapter on visuals.)

Wilderness. See sections on fish enhancement and mitigation measures.

Subsistence. Maintenance and enhancement of fish resources is of positive benefit to subsistence users. Enhancement of fish habitats generally provides greater opportunities for the subsistence user. Since all alternatives maintain and enhance fish habitats to the same degree, there are no differences expected between the alternatives.

Wildlife. Maintenance and enhancement of fish habitats complements the needs of wildlife. Riparian areas in an unharvested condition provide habitat for wildlife species requiring aquatic habitats and, often, old-growth forest conditions. Higher fish populations provide greater food supplies for many fish-eating wildlife species, such as brown bear, black bear and eagles. Since all alternatives maintain and enhance fish habitats to the same degree, there are no differences expected in the interaction between wildlife and fish between the alternatives.

Timber. The maintenance of fish habitat in riparian areas requires that some portions of riparian areas be set aside from timber harvest, or have reduced timber yields due to harvest techniques which do not allow clearcut. Examples of harvest techniques prescribed in the Stream and Lake Protection Management Area are single tree selection and group selection. Those alternatives with greater amounts of timber harvest also have more acres assigned to the Stream and Lake Protection Management Area. Although timber harvest is not anticipated to reduce fish habitat capability in any alternative, larger harvests will increase the risk of negative effects on fish. (See previous portions of this fish section.)

Water. In some instances, increased escapement of anadromous fish could decrease water quality in streams due to the decay of adult spawned carcasses. The change in water quality is usually only a concern where the water is used as a domestic or hatchery water source. These potential effects will have to be analyzed during site-specific planning of fish enhancement projects. Otherwise, maintenance water quality complements optimum fish habitat capability requirements. No appreciable difference is anticipated between the alternatives since all alternatives have similar fish enhancement objectives.

Minerals and geology. Development of mineral resources may be restricted in order to maintain or enhance fish habitat. ANILCA section 505 (a) states: "The

Secretary of Agriculture shall .... maintain the habitats to the maximum extent feasible, of anadromous fish and other foodfish, and (to) maintain the present and continued productivity of such habitat when such habitats are affected by mining activities..." (parentheses and dots added). The effect of this section of ANILCA is the same between all alternatives.

Transportation. The goal to maintain or enhance fish habitat capability results in increased costs of road construction and maintenance. Road crossings of anadromous fish streams and many resident fish streams requires higher construction costs for oversized culverts or bridges. In the vicinity of fish streams, often full bench cut of roads in hillsides is required to prevent sediment from entering streams. These costs are expected to differ by alternative, and be proportional to the miles of road constructed. See Figure 3-25 for estimates of miles of roads to be built through the planning horizon. Forest-wide the largest numbers of roads would be constructed in Alternative D, followed by C, B, F, G, E and A.

Air, soil, lands, facilities, fire, law enforcement, insect & disease, and special areas. No effects of fish on air, soil, lands, facilities, fire, law enforcement, insect & disease, or special areas are anticipated due to implementation of any of the alternatives.

MITIGATION

Three mitigation measures designed to maintain or enhance fish habitat are common to all alternatives: Forest-wide standards for fish habitat, the Stream and Lake Protection management area prescription, and Best Management Practices (BMP's). One mitigation measure is applicable to fish habitat enhancement projects.

Forest-wide standards. Forest-wide standards for fish habitat apply across the Forest (see Appendix G). The standards provide for the goal of maintaining and enhancing fish resources in all alternatives. These standards include: 1) providing for short and long-term maintenance of fish habitat capability, 2) maintaining stream bank and stream channel stability, 3) maintaining natural and beneficial quantities of large woody debris over the long and short term, 4) maintaining water quality to provide for fish production, 5) maintaining or improving water temperatures at a level to optimize salmonid populations, 6) maintaining or improving primary or secondary stream biological production in second-growth forests, and 7) maintaining fish passage through stream crossing structures. Specific implementation guidelines to meet these standards are included in Appendix G, the Aquatic Habitat Management Handbook (FSH 2609.24), and would be applied during site-specific planning of projects.

Stream & Lake Protection Management Area. A riparian management area prescription is applied for instance, along all perennial streams and riparian

areas where the Timber Production Management Area prescription would normally be applied. In areas such as the Primitive Recreation Management Area where management is normally less potentially impacting than could occur in a riparian management area, a riparian management prescription would not apply.

The standards in the Stream and Lake Protection management area prescription (Appendix F) were developed to recognize the unique values of riparian resources and give preferential treatment to riparian associated and dependent resources where management conflicts exist.

The prescription has a variable width streamside management area based on channel types. (Boundaries of the management area are described in Appendix B.) The effects of the prescription's application varies by channel type, but is the same between alternatives. Most low gradient streams and floodplains would have a wide no harvest zone, while moderate gradient and high gradient channels would have less protection from timber harvest. Bank stability and large woody debris input would be maintained at natural levels on all low gradient channels. Moderate and high gradient channels with steep sideslopes would have some risk of bank disturbance and would likely have a decline in large woody debris recruitment. Because of narrower widths of no-cut or single-tree harvest areas in moderate and steeper slopes, there is some risk of catastrophic blowdown. Catastrophic blowdown provides woody debris to stream systems in one large pulse, rather than spread over a long period of time which is more often the case in systems with no timber harvest.

Shade producing vegetation would be maintained in all streams, to meet management area objectives. Shade requirements would need to be developed on a site-specific project basis on streams without a no harvest area adjacent to the stream.

Water quality Class III streams would be provided with variable treatment. Some Class III streams would have narrow no harvest buffers, however many would be subject to clearcut harvest to the streambank. No harvest, or limited harvest buffers (such as using single tree or group selection harvest) would be provided wherever necessary to meet prescription objectives. Best Management Practices (BMP's) for streamside harvest would apply (see next section on BMP's).

Windfirmness of retained trees is achieved through selective harvest of adjacent timber, or where necessary, leaving more unharvested trees than the management prescription requires. The design and success of maintaining windfirm trees need to be developed on a site-specific project basis.

The overall effectiveness of the Stream and Lake management area prescription is modeled in the habitat capability models for the fish management indicator

species. Use of the prescription is anticipated to decrease the coho capability of the Forest overall no more than one-half of one percent, and for Dolly Varden by no more than five percent. These estimates are the maximum that would occur if all available acres of forested land adjacent to streams and lakes were harvested using the guidelines of the Stream and Lake Protection management area prescription. Since all alternatives do not include application of the Stream and Lake Protection management area to all riparian acres, the anticipated effects and success of these mitigation measures are better than the estimates.

Application of the Stream and Lake Protection management area prescription alone, would not necessarily provide for complete maintenance or enhancement of habitats, especially for the pink salmon Management Indicator Species. Pink salmon are dependent on high quality, stable spawning gravels. In order to provide for these conditions, Best Management Practices to protect water quality are applied across the Forest.

Best Management Practices. Best Management Practices (BMP's), included in the Soil and Watershed Conservation Handbook (FSH 2509.22), are applied to all alternatives. Appendix I includes a listing of recommended best management practices identified in the Handbook. Best Management Practices are designed to meet the requirements of the Clean Water Act, State Water Quality Standards, and to reduce the potential for non-point source pollution entering stream channels. FSH 2509.22 provides a guide for conducting land management activities. Actual BMP's to be incorporated into any activity will need to be developed based on those in the Handbook and the individual project and site conditions. For further discussion of the BMP's and watershed mitigation, refer to the sections on Soil and Water.

Aquaculture Development. ANILCA allows aquaculture development throughout the Forest. This may include areas of high visual sensitivity and Wilderness. Wilderness has an objective to maintain natural ecosystems. Aquaculture developments will generally be designed to meet the visual quality objective. In some areas, such as in locations with retention visual quality objectives, construction of a project may not be possible without a minor variance in the objective. However, whenever possible, facilities shall be constructed of materials which blend with, and are compatible with, the immediately surrounding landscape.

In order to mitigate the effects of aquaculture development in wilderness, the following analysis of suitability of fish habitat enhancement will be followed during project planning:

> Evaluate the: 1) availability of suitable non-wilderness opportunities, 2) effects on wilderness conditions, in general; 3) effects on wilderness ecosystems and desired solitude level due to an enhanced fishery resulting

in increased recreation use; 4) effects on ecosystems due to the introduction of species not indigenous to the watershed; and, 5) appropriateness of structures both in type and scale to the Recreation Opportunity Spectrum Class (ROS) setting.

For projects in Wilderness which require construction, developments shall involve those facilities essential to operations (of facilities) and shall be constructed in such rustic manner as to blend into the natural character of the area. Land disturbing activities necessary for construction will be temporary.

INSECTS AND DISEASES

AFFECTED ENVIRONMENT

The Forest Service conducts annual aerial surveys to locate insect infestations and disease infections on 30 million acres of National Forest, other federal, Native, state, and private lands in Alaska. In 1988, about one million acres were found to be infested with insects or diseases. The major pests detected in Southeast Alaska are discussed below.

Current Situation

In the last few years there has been a net decline in insect and disease activity throughout Southeast Alaska. While this decline is associated with natural population cycles and not implementation of the Forest Plan, there is still a need to continue to implement sound silvicultural practices in young-growth stands.

Hemlock Sawfly, *Neodiprion tsugae* (Middleton) - Populations of the hemlock sawfly were at low levels in 1988. No visible defoliation was detected in 1988, compared to 2,000 acres in 1987. The last major infestation, 1983 to 1985, produced top-kill and tree mortality on more than 14,000 acres throughout Southeast Alaska. This insect reduces the amount and value of the timber resource, and infected timber stands can be a short-term negative impact on visual quality.

Spruce Beetle, *Dendroctonus rufipennis* (Kirby) - In Southeast Alaska, spruce beetle activity was low in 1988. Light additional spruce mortality occurred in Glacier Bay National Park, but the total affected acreage did not expand appreciably from the previous year. Slightly over 18,000 acres have been affected in the Park; mortality ranges from 5 percent to 75 percent of the trees in nearly pure stands of Sitka spruce. Small patches of older spruce mortality are evident along the outer coast of Glacier Bay National Park from Dundas Bay to Palma Bay. These patches total less than 500 acres, and do not appear to be expanding.

The spruce beetle has the potential (stands entered in order of preference would be: 1-large diameter trees along creek bottoms, 2-better stands on benches, 3-poorer stands on ridges and benches, 4-mixtures of spruce and other species, and 5-stands of immature trees: Insects and Diseases of Alaskan Forests, USDA, Forest Service, Report No. 181, 1985, page 61) of becoming a serious insect pest of unmanaged young-growth Sitka spruce. The potential loss could reach 50 to 75 percent of all young-growth Sitka spruce stands on the Tongass National Forest. This could represent a substantial loss in the productivity and value of the timber resource, a long-term negative impact on recreation and aesthetics, and a negative impact on wildlife habitat.

Hemlock dwarf-mistletoe, *Arceuthobium tsugense* (Rosendhal, G.N. Jones) - Dwarf-mistletoe is a destructive disease of western hemlock throughout Southeast Alaska as far north as Haines. It is absent further west along the coastal area of the Gulf of Alaska. In Southeast, infestation levels vary in old-growth hemlock stands. Dwarf-mistletoe is absent in some stands; in other stands almost every hemlock is infected. Western hemlock trees heavily infected with dwarf-mistletoe can have volume growth reduced by 50 percent over a 100 year period. Dwarf-mistletoe tend to be species specific. Sitka spruce and mountain hemlock are only rarely infected by this parasite.

The spread of dwarf-mistletoe to young hemlock stands is often a result of the practice of leaving infected non-merchantable hemlock trees in cutover areas. This practice can have a serious impact on long-term timber volume production, particularly, on lower site quality stands.

Alaska Yellow-Cedar Decline - Decline and mortality of Alaska yellow-cedar continues to be one of the most widespread and important forest diseases in Southeast Alaska. Some 340,000 acres of decline have been mapped during aerial detection surveys. Since the onset of decline about 100 years ago, cedar trees have died every year. In 1988, dying, discolored trees were particularly concentrated on the southern half of Kuiu Island and the northeast portion of Slocum Arm on Chichagof Island. The patterns of tree death and apparent absence of a causative disease suggest that some form of environmental stress may be the source of the problem.

Since Alaska yellow-cedar represents high commercial timber values, this annual mortality results in a significant loss in timber resource values. In addition, substantial acres of old-growth cedar forests are dying with little cedar regeneration to replace them.

Hemlock Fluting - Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their trunks, a condition that reduces the value of hemlock logs because they yield less sawlog volume, and some of the milled wood contains bark. Fluting continues to be a problem throughout Southeast Alaska. Researchers have recently explored reasons for this trunk deformation and have documented its presence in young hemlock stands. The cause of fluting is still unknown.

Decays - Aside from the Alaska yellow-cedar decline, stem and root decays have a potential of becoming the major disease problem in Southeast Alaska. These organisms spread through stumps and wounds, and increased harvesting activities will invariably increase the impacts from these organisms. Potential yield could be reduced by as much as 20 percent in affected stands.

Future Trends

The greatest potential for insect and disease increases is in young-growth stands as they approach maturity. At this time, tree vigor decreases and susceptibility to insects and diseases increases. The spruce beetle especially has the potential to significantly alter the desired condition of these forested areas. Stem decays and root diseases have historically increased with intensified land management activities. The impacts of these insects and diseases can be mitigated through silvicultural techniques. Each insect or disease situation must be treated on a case-by-case basis with treatment designed to reduce impacts of the infestation or infection, and to meet the management goals of the affected area.

INSECTS AND DISEASES

ENVIRONMENTAL CONSEQUENCES

DIRECT AND INDIRECT EFFECTS

Alternative D has the highest potential for insect- and disease-related problems associated with the amount of timber harvest and second-growth stand development. Alternatives C, B, G, F, E and A respectively have less potential for serious insect and disease outbreaks.

In general, native insect and disease infestations in old-growth forests will be allowed to run their course. Tree losses will be accepted, yet harvesting flexibility will be maintained to take advantage of timber salvage opportunities. Insect suppression may be justified in high quality, old-growth stands that cannot be salvaged immediately, or that lie near recreation areas and communities where scenic values are high.

CUMULATIVE EFFECTS

Due to the nature of the Forests in Southeast Alaska, which are primarily old growth with few contiguous blocks of second growth, insects and disease have had little known effect on overall timber availability. Presently, Alaska yellow-cedar has the highest market value of the commercial timber species of the Tongass. Although it occupies only two percent of forested lands, it has the potential to be an important factor in the overall market value of individual timber sales. If solutions aren't found to the Alaska yellow-cedar decline, the future overall market value of timber could be reduced.

The possibility of major future losses to standing timber resulting from insects or disease will increase as timber harvest increases the amount of second-growth timber. A significant loss of available timber could occur if epidemics can not be controlled. Detection methods to discover problem areas where epidemic occurrences may begin are currently being used.

MITIGATION

Integrated pest management is the key to reducing the insect and disease impact on forest resource values. Integrated pest management is an approach to reducing pest damage to tolerable levels through a variety of techniques, including predators and parasites, genetically resistant hosts, natural environmental modifications and, when necessary and appropriate, chemical pesticides. State-of-the-art integrated pest management places emphasis on modifying the natural environment through silviculture.

The ultimate goal of silviculture in integrated pest management is the creation of plant diversity both in species mix and in age distribution. Plant diversity provides the greatest opportunity for ensuring a healthy forest. Most insects and diseases are host-specific, or depend upon plants which are under stress. Therefore, increasing species, age class, and structural diversity will decrease

losses caused by insects and diseases, and in turn reduce their impacts. Diversity can be influenced through processes outside the control of the land manager (windthrow, wildfire, landslide, etc...) or purposefully directed by the land manager.

The Forest Service is currently developing a National Forest Health Strategic Plan based on these principles. The Final Forest Plan Revision will include by reference the Forest Health Plan as part of implementation direction. Prevention, supplemented by suppression, will be the primary approach to insect and disease management for young growth.

Scheduling timber harvest of high-risk stands before infestation occurs is another control measure planned by the Forest. To the extent feasible, timber harvest in this as well as future decades will be scheduled in the most high-risk stands identified through silvicultural prescription.

LANDS

AFFECTED ENVIRONMENT

Special Use Administration

In Fiscal Year 1989 there were 507 non-recreation special use authorizations on the Tongass National Forest. Most of these (59 percent) were for industrial uses such as commercial fishing camps, or for transportation uses such as roads. Another type, electronic sites, are listed in Appendix P. This list includes both existing and proposed electronic sites. The proposed sites have been approved through separate site-specific analyses. These sites are designated for future additional joint occupancy and use, as provided in Forest Service Manual 2720.

Land Ownership Administration

State Selections. The Alaska Statehood Act of 1959, Section 6a, authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within National Forests in Alaska, for furthering the development and expansion of Alaskan communities. ANILCA, Section 906, provides that the State has until 1994 to complete its selections and that the state may select lands 25 percent in excess of its remaining entitlement. Only the actual entitlement will be conveyed from these selections.

As of October 1, 1989, the State had received title to approximately 221,736 acres (or 55 percent) of their 400,000 acre entitlement. Of the 221,736 acres conveyed to the State, 154,023 acres (or 69 percent) are located on the Tongass National Forest. The State has completed its National Forest selection process and applied for all remaining entitlement. Most of the land requested by the State has been approved by the Forest Service. Minor changes may occur in the future, if the State relinquishes some acres and replaces them with selections in other locations, prior to the 1994 deadline.

Native Selections. The Alaska Native Claims Settlement Act of 1971 (ANCSA) provided for conveyance of the surface estate to 23,040 acres of land to each of the ten Native village corporations and two urban corporations located in Southeast Alaska. The Regional Corporation, Sealaska, was to receive additional acres of surface lands, and the subsurface of lands conveyed to the village and urban corporations. Native individuals were entitled to up to 160 acres if they could demonstrate that they occupied the land as a primary place of residence on August 31, 1971. Some additional acres resulted from land exchanges directed in ANILCA to help preserve the natural and recreational values of Admiralty Island National Monument, while still protecting the rights of the Natives involved.

To allow Native corporations to meet selection deadlines established by ANCSA, USDI Bureau of Land Management Regulations (43 CFR 2651-2653) authorized

Native corporations to select lands in excess of their entitlement; however, when conveyances are completed only the entitlement will be conveyed to each Native corporation.

ANCSA (as modified by ANILCA) provides that a total of approximately 597,000 acres of land are to be conveyed to Natives from the Tongass National Forest. As of December 1, 1989, approximately 519,800 acres (87 percent) of these acres had been conveyed, leaving approximately 77,200 acres remaining to be conveyed. The Tongass Land Management Plan accounted for 575,133 acres of Native entitlement, in calculating the future available Tongass National Forest landbase, this figure overestimated the future available Tongass National Forest landbase by 22,173 acres. For additional information on Native selection rights, see Chapter 3, "Lands," in the Analysis of the Management Situation.

Native Allotments. The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to the land's designation as National Forest, to apply to the Bureau of Land Management for conveyance of up to 160 acres, under conditions prescribed by the Act and Federal Regulations. ANCSA, Section 18(a), repealed the Native Allotment Act with the provision that allotment applications submitted prior to enactment of ANCSA (December 18, 1971) could still be processed.

Within the Tongass National Forest, as of April 11, 1989, there have been 174 acres of land conveyed under this authority. Another 122 applications await adjudication by the Bureau of Land Management (BLM). Applications still pending adjudication by BLM are considered active claims and restrict Forest Service management activities within the area claimed.

Land Ownership Adjustments

The Haida Land Exchange Act of 1986, Section 10, provides Haida Corporation the option to exchange lands, known as "Haida Exchange Lands," for other National Forest System lands after January 1, 1995. Haida Corporation has informed the Forest Service of their intent to exchange for approximately 8,670 acres of surface estate under this authority at the Portage/Sulzer area, in Cholmondeley Sound, Prince of Wales Island.

The Haida Land Exchange Act, Section 4, provides Sealaska Corporation the opportunity to exchange their subsurface estate in certain lands, for lands or interests in land, elsewhere, of equal value. Sealaska Corporation has elected to exchange approximately 5,440 acres of its subsurface to the Forest Service, in return for lands or interests in land of equal value, at an undetermined location which is subject to Forest Service concurrence.

Transportation and Utility Systems

Transportation and Utility Systems (TUS) are usually major rights-of-way corridors and their associated sites. The rights-of-way are granted by the Forest Service. These systems include roads designated as State and Federal Highways, powerlines 66 kV or greater, and pipelines 10 inches or more in diameter. Water pipelines greater than 10 inches are included if they are a public utility (i.e., if they service a community water supply). The transportation section of this chapter contains additional information on transportation facilities.

The current Tongass Land Management Plan provides the following goals related to transportation and utility systems:

1. *Hydroelectric Power*. The goal is to facilitate the development of hydroelectric power sites with identified high development potential by managing those sites, and their attendant transmission corridors, in ways which will allow development of these facilities with due consideration of the other various resources.

2. *Road Corridors*. The goal is to insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the other various resources.

Recognizing potential TUS corridors and sites, and preserving future options, can facilitate development if such facilities are needed in the future. A list of currently identified potential TUS corridors and sites is given in Chapter 3, "Lands" of the Analysis of the Management Situation (Tongass National Forest, January 1990).

LANDS

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Special Use Administration

Existing policies and guidelines for special use management are not always specific enough to achieve consistent management decisions between the Tongass National Forest's administrative units. The proposed Forest-wide standards and guidelines (see Appendix G) will provide more specific direction to supplement the existing Forest Service Manual policies.

The electronic sites listed in Appendix P are either already existing or are approved for future use. Additional sites, if identified, will be analyzed in a site-specific environmental analysis.

Land Ownership Administration

Future adjustments to certain resource programs may be needed to account for a changing land base as a result of lands selected by the State of Alaska, Native corporations, and Native individuals. Most likely to be affected are: (1) the allowable sale quantity for timber harvest, (2) internal boundary maintenance programs, and (3) programs dependent upon access to public lands.

The State will receive an additional 178,264 acres, largely from lands currently selected under the Alaska Statehood Act within the Tongass and Chugach National Forests. Native corporations and individuals will receive approximately 77,530 additional acres from lands selected under the Alaska Native Claims Settlement Act of 1971 (ANCSA), and Native individuals could receive in excess of 10,000 additional acres in Native allotments, from lands applied for under the Alaska Native Allotment Act of 1906.

In addition to these lands the State and Natives will receive in fee title, many other areas are encumbered by selections which restrict Forest Service management. There is no time limit for conveyance of the Native lands.

Land Ownership Adjustments

Land adjustments resulting from the Haida Land Exchange Act are not final, and not yet ready for analysis. Some are the result of legislative action which is binding and not discretionary on the part of the Forest Service.

Transportation and Utility Systems

Table 3-28 displays the acres of Transportation and Utility System (TUS) "Windows" and "Avoidance Areas" by alternative. A *TUS Window* is an area potentially available for the location of transportation or utility corridors and sites. Windows represent areas of future opportunity where the applied management direction will not conflict with future designation of a TUS. A site-specific analysis is still required during project level planning, to identify resource protection needs within these areas.

A *TUS Avoidance Area* is an area where the establishment and use of transportation or utility corridors and sites is not desirable given the management area emphasis. A search for windows should be exhausted before TUS facilities are considered in avoidance areas. When practical, these areas should be avoided through site-specific analysis during project level planning. Avoidance areas include Congressionally and administratively designated areas, including Wilderness. Although special environmental or procedural considerations may be required for these areas, these special designations do not preclude consideration and use as a TUS.

Windows and Avoidance Areas are designated through the allocation of lands to management prescriptions specifically identified as a TUS Window or a TUS Avoidance Area in their standards and guidelines.

TABLE 3-28
ACRES OF TRANSPORTATION AND UTILITY SYSTEM WINDOWS AND AVOIDANCE AREAS, BY ALTERNATIVE

	Windows	*Avoidance Areas*
Alt. A	2,457,000	14,998,000
Alt. B	3,062,000	14,517,000
Alt. C	5,868,000	11,600,000
Alt. D	5,688,000	11,784,000
Alt. E	4,868,000	12,600,000
Alt. F	5,378,000	12,090,000
Alt. G	5,484,000	11,984,000

Source: Revision Database, 3/4/90.

The development of transportation on utility corridors is not precluded anywhere under any alternative. Alternatives C, D, F and G have a greater potential to readily accommodate Transportation and Utility Systems; Alternatives A, E and B have a lesser potential. This is because of the larger number of acres designated as TUS Windows in Alternatives C, D, F and G. Future Transportation and Utility Systems may be constructed through both Windows and Avoidance Areas; however, TUS construction through Avoidance Areas will take place only after a search for Windows has been exhausted. For further information regarding management direction for Windows and Avoidance Areas, see the the Forest-wide Standards and Guidelines, Lands Special Use Administration Section, in Appendix G.

MINERALS

AFFECTED ENVIRONMENT

The Forest Service recognizes that minerals are fundamental to the Nation's well being, and as policy encourages the exploration and development of the mineral resources it manages. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on National Forest System lands.

A wide variety of mineral deposit types and mineral resources occur within the boundaries of the Tongass National Forest. Examples of some of these mineral resources are gold, silver, molybdenum and uranium, as well as nationally-designated "strategic" and "critical" minerals such as lead, zinc, copper, tungsten and platinum group metals. Strategic and critical minerals are defined, by the Strategic and Critical Materials Stock Piling Act of 1979, as those necessary to supply military, industrial, and essential civilian needs during a national defense emergency, and not found or produced in the United States in sufficient quantities to meet emergency needs.

Mineral resources are legally divided into three groups: locatable minerals, leasable minerals, and salable minerals. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group of minerals.

Locatable Minerals

A locatable mineral is any mineral which is "valuable," in the usual economic sense, or has a property that gives it distinct and special value. Examples of some locatable minerals on the Tongass National Forest are gold, silver, copper, molybdenum, iron, nickel, lead, zinc, and uncommon varieties of limestone and marble.

Every citizen of the United States has a statutory right, granted under the General Mining Law of 1872 as amended, to prospect and explore public domain lands open to mineral entry. The right of access is guaranteed by the Mining Law and is not at the discretion of the Forest Service. Upon discovering a valuable mineral deposit, citizens have the right to locate a mining claim and remove the mineral resources. The citizen holding a mining claim is called the claimant. The claimant is responsible for initiating mining activities and investing the capital required to conduct mineral exploration, site development, mine operation, and reclamation of the site.

By law, designated Wilderness, National Monuments, and other withdrawn areas are closed to mining claim location. These withdrawn areas, however, are subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future. Before mining operations in a withdrawn area are approved, a mineral validity examination is conducted for each claim by a certified Forest Service mineral examiner to determine if there are valid existing rights established under the General Mining Law of 1872.

The Forest Service works with claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining plan of operations submitted by the claimant, disclosing impacts of the proposed mining operations in an environmental document, approving only those activities specified in a plan of operations that are reasonably necessary for the proposed operation, monitoring mining operations to ensure environmental standards specified in the plan of operations are met, and ensuring prompt reclamation of disturbed areas.

Locatable Supply. Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau, Alaska. This discovery sparked keen interest and by the turn of the century dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained quite active until World War II. From the close of World War II to the mid-1970's exploration and mineral production in Southeast Alaska remained low compared to the activity documented at the beginning of the century. Prospecting and exploration generally increased during the mid-1970's, in part due to the Quartz Hill/Greens Creek discoveries, improved metal prices, and deregulation of gold. Metal prices have continued to improve since the mid-1980's, resulting in increased exploration and renewed interest in precious metals, mainly gold.

Most estimates of mineral resource potential use a format recognized and developed by the U.S. Bureau of Mines and the U.S. Geological Survey (USBM and USGS, 1980). Mineral resources are divided into identified resources (the primary responsibility of the U.S. Bureau of Mines) and undiscovered resources (the primary responsibility of the U.S. Geological Survey).

The gross metal value of identified mineral resources were estimated for the Tongass National Forest by the U.S. Bureau of Mines (Coldwell, 1989). The emphasis of the report was on critical and strategic minerals and those deposits

likely to be developed in the next decade. In this report, the U.S. Bureau of Mines analyzed 171 identified mineral deposits across Southeast Alaska, 148 of which were located within the Tongass National Forest. Each deposit located in the Tongass was assigned to a mineral deposit model (after Berg, 1984), and further grouped into 52 mineral activity tracts. Tonnage and grade were determined for each mineral deposit based on published identified resources or were calculated using statistical tonnage and grade models developed by Cox and Singer (1986). The identified gross metal value was calculated by combining the tonnage and grade figures with an average price from the period 1978-1987 for each commodity.

The total gross in-place metal value of identified mineral resources for Southeast Alaska is estimated to be 1.33 trillion dollars (USBM, 1989). The total gross in-place metal value of identified mineral resources for the Tongass National Forest is estimated to be $43.8 billion dollars. Table 3-29 displays the identified gross metal values, by commodity, for the Tongass National Forest in 1988 dollars.

TABLE 3-29
GROSS METAL VALUES OF IDENTIFIED MINERAL RESOURCES ON THE TONGASS NATIONAL FOREST

Commodity		*In Situ Identified Resources*		*Dollars (1988)*
Barite		266,000	tons	10,391,000
Cobalt	*	9,680,000	lbs	64,856,000
Copper	*	452,628,000	lbs	416,418,000
Gold		4,954,000	tr oz	2,261,369,000
Iron		193,045,000	tons	12,711,989,000
Lead	*	484,678,000	lbs	184,178,000
Molybdenum		4,502,646,000	lbs	25,755,135,000
Nickel	*	151,244,000	lbs	431,044,000
Palladium	*	122	oz	17,000
Platinum	*	1,350	oz	680,000
Silver		105,840,800	oz	1,225,636,000
Tungsten	*	425,800	lbs	667,000
Uranium		499,300	lbs	8,313,000
Vanadium	*	7,500,000	lbs	30,750,000
Zinc	*	1,407,428,000	lbs	661,406,000
Total				**43,762,849,000**

Source: Coldwell, 1989.
An * denotes commodities that are designated critical or strategic minerals by the U.S. Bureau of Mines (1983).

Locatable Demand. Minerals are used each day by everyone; our culture and society are dependent on their use. Without mining and minerals we would not

have modern fishing or logging equipment, airplanes or automobiles, computers, telephones or televisions. The average color television set contains 35 different minerals, from copper to yttrium. All of these minerals must be removed from beneath the surface of the earth using modern mining methods.

Demand for mineral resources can be inferred based on the amount of money spent by the mining industry to prospect and explore for mineral resources in Southeast Alaska. Increases in the amount of money spent on exploration reflect an increase in demand for mineral resources.

Between 1981 and 1988 the mineral industry spent an average of 7.38 million dollars per year on mineral exploration in Southeast Alaska. In 1988 the mining industry spent 20.64 million dollars on exploration, creating approximately 35,987 person days of work (Green et al., 1989). Table 3-30 illustrates the reported expenditures between 1981 to 1988 for exploration activities in Southeast Alaska (Green et al., 1989). The Alaska State Department of Geological and Geophysical Surveys mailed 950 questionnaires on mining activity in Alaska to private firms and individuals in the mining industry, 245 of which were returned. The figures, therefore, represent reported expenditures only.

TABLE 3-30
REPORTED EXPENDITURES FOR EXPLORATION ACTIVITIES IN SOUTHEAST ALASKA, 1981-1988

Year	*Million of Dollars*
1981	20.94
1982	1.52
1983	1.95
1984	2,87
1985	2.53
1986	2.75
1987	5.85
1988	20.64
TOTAL	**59.05**

Source: Green et al., 1989.

Demand for mineral resources can also be inferred by modeling the economic viability of identified mineral resources. Identified mineral resources with high degrees of economic viability will reflect an increase in mineral related activities or in demand for those resources by industry.

The economic viability of 148 mineral deposits located within the Tongass National Forest was modeled by the U.S. Bureau of Mines (Coldwell, 1989). The modeling analysis compared the gross metal value of the identified mineral resources

estimated for each deposit with the estimated capital and operating costs of the mine, mill, and infrastructure required to remove the mineral resources. The US Bureau of Mines model considered location and number of existing claims, mineral occurrence, mineral terrain, mineral deposit model, regional and deposit geology, market price projections, mining models to extract minerals, pre-tax net present value (NPV) at zero percent discounted cash flow rate of return (DCFROR), after-tax NPV at four percent. DCFROR, sensitivity to increased metal prices, critical or strategic designation, and current commodity interest by industry.

Fifty-two (52) mineral activity tracts were classified by the U.S. Bureau of Mines as having a high potential for experiencing mineral exploration or development activity during the next 10 to 15 years. The mineral activity tracts were ranked 1, 2 or 3 based upon the following criteria:

Rank 1 Mineral activity tracts mapped with a ranking of 1 would have at least one deposit with a positive, after-tax net present value (NPV) at four percent discounted cash flow rate of return (DCFROR) and/or would contain at least one active gold deposit.

Rank 2 Mineral activity tracts of ranking 2 would have at least one deposit with a positive pre-tax NPV at zero percent DCFROR and/or contain at least one deposit with critical and strategic minerals.

Rank 3 Mineral activity tracts of ranking 3 would have deposit areas with insufficient reserve estimates to perform a reliable NPV economic analysis. It would not contain any deposits with critical or strategic minerals or deposits with positive, after-tax NPV at four percent or a positive pre-tax NPV at zero percent DCFROR.

Nearly all of the mapped mineral activity tracts contain one or more deposits. For example, the Juneau Gold Belt contains the Alaska Juneau mine with a NPV of 373,811,000 dollars at four percent DCFROR, the Kensington and Jualing deposits with positive pre-tax NPV at zero percent DCFROR, and 26 other deposits which did not show positive NPV. Nevertheless, the entire Juneau Gold Belt tract has a ranking of 1 due to the emphasis given areas likely to have high exploration and development activity in the next 10 to 15 years.

All mineral activity tracts ranked priority 1, 2 or 3 will reflect a higher demand for mineral resources than areas outside the mineral tracts. Those deposits evaluated to have a positive NPV, and the activity tract that deposits are located in, could anticipate higher levels of mining-related activities than deposits currently with a negative NPV. Those deposits with a positive NPV at zero percent DCFROR are displayed in table 3-31.

TABLE 3-31
TONGASS MINERAL DEPOSITS WITH A POSITIVE NET PRESENT VALUE AT ZERO PERCENT DCFROR

Deposit Name	*Dollars (1988) in Billions*
Bohemia Basin	0.202
Kensington	0.287
Johnson	0.041
Jualin	0.055
Herbert	0.005
Greens Creek	1.398
Chichagof & Hirst	0.155
Chichagof Tailings	0.012
Mt. Andrews	0.013
Union Bay	7.077
Goldstream	0.00064
Quartz Hill	17.792
Bokan	0.719
TOTAL	**27.758**

Source: Coldwell, 1989.

Table 3-32 displays the acres of the mineral activity tracts by rank.

TABLE 3-32
ACRES OF MAPPED MINERAL ACTIVITY TRACTS ON THE TONGASS NATIONAL FOREST

Rank	*Acres*
Priority 1	392,443
Priority 2	33,968
Priority 3	179,578
Total	**604,987**

Figure 3-18 displays the location of all mineral activity tracts with high development potential on the Tongass National Forest. Table 3-33 displays the Identified Mineral Resources of the Tongass National Forest by mineral activity tract.

FIGURE 3-18
HIGH DEVELOPMENT POTENTIAL MINERAL ACTIVITY TRACTS, TONGASS NATIONAL FOREST

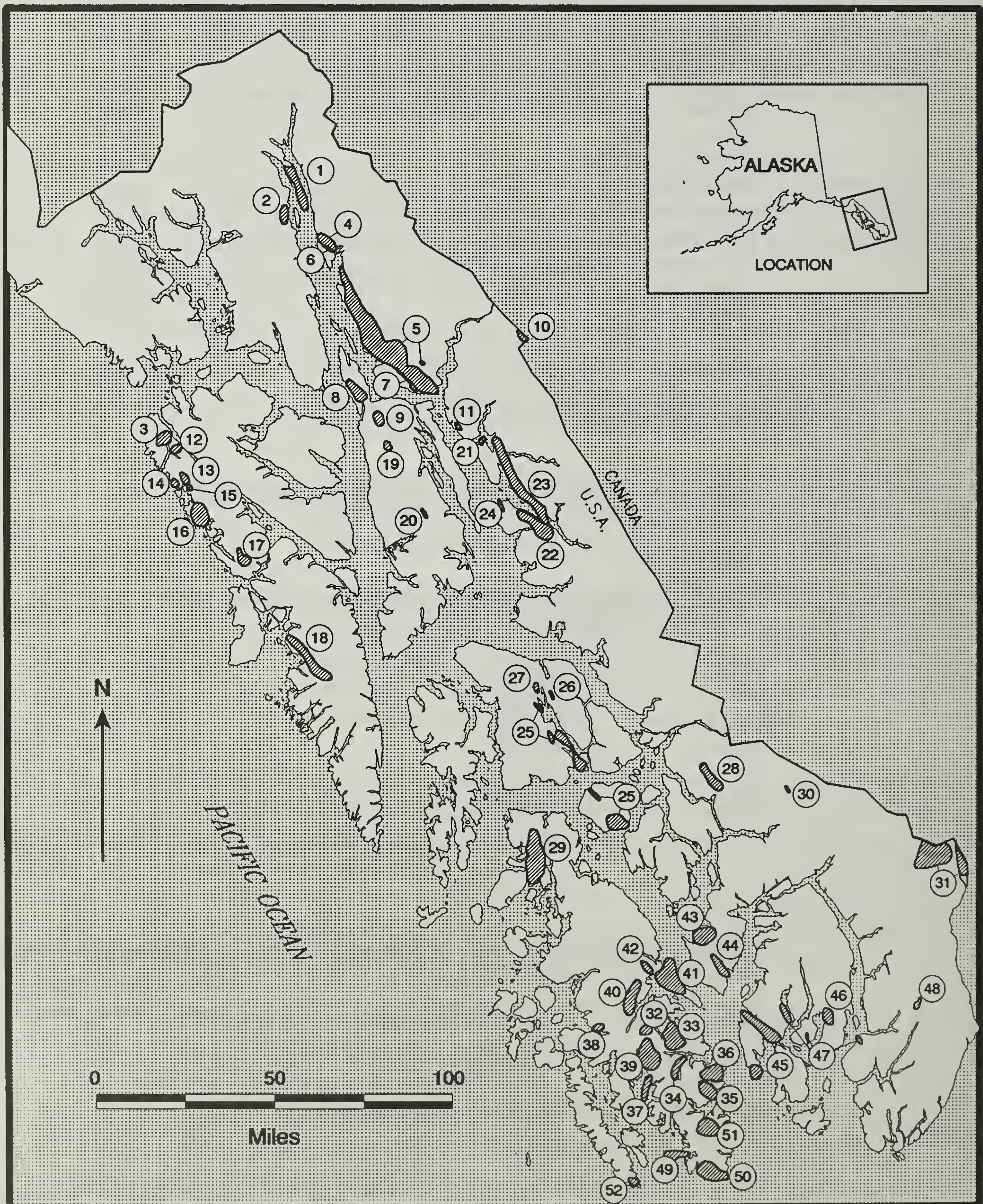


TABLE 3-33
IDENTIFIED MINERAL RESOURCES OF THE TONGASS NATIONAL FOREST BY MINERAL ACTIVITY

	Quad	Tract Name	Mnl-ID	Acres	Rank	Critical	Type 1	Type 2	Gross Value ($)	Net Present Value ($)
1	Skg	Chilkat Penn.	109-5	40	3	—	V	—	10,954,000	—
2	Skg/Jun	Sullivan	109-6	7,938	1	Yes	V	—	0	—
3	Fwr/Sit	Bohemia Basin	111-8	9,376	1	Yes	MOS	—	530,320,000	202,032,000
4	Jun	Berners Bay	112-1	10,318	1	—	V	—	918,086,000	382,810,000
5	Jun	Juneau Gold Bel	112-2	85,699	1	Yes	V	—	387,947,000	5,195,000
6	Jun	Fremming	112-3	501	3	—	MS	—	5,859,000	—
7	Jun	Douglas Is	112-4	1,319	2	—	MS	—	163,311,000	—
8	Jun	Funter Bay	112-7	11,499	1	Yes	V	MOS	25,721,000	—
9	Jun	Greens Creek	112-8	7,528	1	Yes	MS	—	1,683,141,000	1,398,284,000
10	Tak	Taku Mo	113-1	3,199	3	—	P	—	11,440,000	—
11	Tak	Enterprise	113-2	1,505	3	—	V	—	4,793,000	—
12	Sit	Apex-El Nido	114-1	4,603	2	—	V	—	11,655,000	—
13	Sit	Basaltic Cu	114-2	4,484	3	Yes	MS	—	2,502,000	—
14	Sit	Mirror Harbor	114-3	2,242	2	Yes	MOS	—	21,233,000	—
15	Sit	Pinta Bay	114-4	1,301	3	Yes	V	—	0	—
16	Sit	Chichagof	114-5	12,946	1	Yes	V	—	329,155,000	167,448,000
17	Sit	Slocum Arm	114-6	8,625	3	Yes	P	—	0	—
18	Sit/Pta	Silver Bay	114-7	22,706	3	Yes	V	—	0	—
19	Sit	Pyrola	114-8	3,261	2	Yes	MS	—	106,854,000	—
20	Sit	Hasselborg	114-9	1,860	3	Yes	MS	—	0	—
21	Sum	Crystal/Friday	115-1	1,391	2	—	V	MOS	27,386,000	—
22	Sum	Windham Bay	115-2	23,909	3	Yes	V	—	9,664,000	—
23	Sum	Sumdum	115-3	41,419	3	Yes	MS	—	487,093,000	—
24	Sum	Pt Astley	115-4	2,004	3	Yes	MS	—	35,009,000	—
25	Pbg	Zarembo	117-1	27,886	1	Yes	MS	V	60,008,000	—
26	Pbg	Portage Mtn	117-2	1,280	3	Yes	V	—	5,678,000	—
27	Pbg	Duncan	117-3	2,393	3	Yes	S	—	50,000	—
28	Pbg/Brd	Grnd Hog/Glaci	117-5	15,859	1	Yes	MS	V	237,677,000	—
29	Pbg	El Cap Pass	117-6	42,763	1	—	V	P	2,837,000	—
30	Brd	N. Bradfield Cn	118-1	1,120	3	Yes	S	—	23,790,000	—
31	Brd/Ktn	Hyder	118-2	56,396	1	Yes	V	—	95,497,000	—
32	Crg	Franks Ridge	119-1	5,866	3	Yes	MS	—	0	—
33	Crg	Khayyam	119-2	23,450	1	Yes	MS	—	5,970,000	—
34	Crg	South Arm	119-3	7,943	3	Yes	MS	—	0	—
35	Crg	Niblack	119-4	8,915	1	Yes	MS	V	0	—
36	Crg	Dolomi	119-5	8,634	1	Yes	MS	V	0	—
37	Crg	Lime Point	119-6	900	3	—	MS	—	2,123,000	—
38	Crg	Big Harbor	119-7	3,535	3	Yes	MS	—	0	—
39	Crg	Jumbo	119-8	12,326	1	Yes	S	—	31,848,000	—
40	Crg	Hollis	119-9	17,148	1	—	V	—	0	—
41	Crg	Kasaan	119-10	8,176	1	Yes	S	V	0	13,311,000
42	Crg	Salt Chuck	119-13	4,817	1	Yes	MOS	—	2,757,000	—
43	Crg	Union Bay	119-14	17,492	3	—	MOS	—	12,511,500,000	7,077,019,000
44	Ktn/Crg	Helm Bay	120-1	7,204	1	—	V	—	49,203,000	—
45	Ktn	Tongass Narrows	120-3	4,488	1	—	V	—	85,451,000	637,000
46	Ktn	Thorne Arm	120-5	7,657	1	—	V	—	51,668,000	—
47	Ktn	George Inlet	120-6	6,198	3	Yes	MS	V	45,308,000	—
48	Ktn	Quartz Hill	120-7	2,402	2	—	P	—	25,740,000,000	17,792,655,000
49	Dxn	Barrier Island	121-1	4,414	3	Yes	MS	—	0	—
50	Dxn	Nichols Mtn	121-2	16,882	3	Yes	MS	—	0	—
51	Dxn	Bokan	121-3	17,750	2	Yes	MUR	—	4,157,915,000	719,244,000
52	Dxn	McLeod Bay	121-4	2,287	1	—	MS	—	0	—

TABLE 3-33 (continued)
IDENTIFIED MINERAL RESOURCES OF THE TONGASS NATIONAL FOREST BY MINERAL ACTIVITY

	Gold (tr oz)	*Silver (oz)*	*Lead (lbs)*	*Zinc (lbs)*	*Copper (lbs)*	*Molybdenum (lbs)*	*Iron (tons)*
1	24,000	—	—	—	—	—	—
2	—	—	—	—	—	—	—
3	—	—	—	—	82,000,000	—	—
4	2,011,450	—	—	—	—	—	—
5	5,519,693	4,794,500	201,840,000	201,493,200	164,000	—	—
6	7,500	30,000	300,000	4,200,000	—	—	—
7	357,800	—	—	—	—	—	—
8	—	—	—	—	3,920,000	—	—
9	630,000	84,000,000	273,000,000	679,000,000	—	—	—
10	—	—	—	—	—	882,000,000	—
11	10,500	—	—	—	—	—	—
12	25,536	—	—	—	—	—	—
13	—	—	—	—	2,719,900	—	—
14	—	—	—	—	2,529,600	—	—
15	—	—	—	—	—	—	—
16	716,000	203,000	—	—	—	—	—
17	—	—	—	—	—	—	—
18	—	—	—	—	—	—	—
19	—	5,715,000	16,510,000	55,600,000	—	—	—
20	—	—	—	—	—	—	—
21	60,000	—	—	—	—	—	—
22	20,655	20,120	4,000	4,000	—	—	—
23	6,678	8,129,140	224,800	37,002,000	313,975,000	—	—
24	58,800	89,000	2,400,000	11,786,000	758,000	—	—
25	7,800	3,174,000	10,060,200	31,548,000	1,133,000	—	—
26	10,040	55,200	—	—	—	—	—
27	—	—	—	—	54,000	—	—
28	—	683,784	126,230,000	404,230,000	286,000	—	—
29	—	0	0	0	0	496,040	—
30	—	—	—	—	3,420,000	313,500	—
31	107,999	1,755,175	53,797,300	4,673,920	1,919,200	150,000	0
32	—	—	—	—	—	—	—
33	5,040	25,200	—	1,562,400	2,872,800	—	—
34	—	—	—	—	—	—	—
35	—	—	—	—	—	—	—
36	—	—	—	—	—	—	—
37	—	—	—	—	—	—	—
38	—	—	—	—	—	—	—
39	28,800	63,900	—	—	4,500,000	—	472,050
40	—	—	—	—	—	—	—
41	43,200	95,850	0	—	22,987,320	—	2,437,367
42	1,189	19,635	—	—	2,140,700	—	—
43	—	—	—	—	—	—	190,000,000
44	107,800	—	—	—	—	—	—
45	189,240	—	—	—	—	—	—
46	113,200	—	—	—	—	—	—
47	78,144	—	312,000	16,344,000	2,000,000	—	—
48	—	—	—	—	—	4,500,000,000	—
49	—	—	—	—	—	—	—
50	—	—	—	—	—	—	—
51	—	—	—	—	—	—	—
52	—	—	—	—	—	—	—

TABLE 3-33 (continued)
IDENTIFIED MINERAL RESOURCES OF THE TONGASS NATIONAL FOREST BY MINERAL ACTIVITY

	WO3 (lbs)	*Platinum (oz)*	*Palladium (oz)*	*Nickel (lbs)*	*Cobalt (lbs)*	*Barite (tons)*	*U238 (lbs)*
1	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—
3	—	—	—	140,800,000	8,000,000	—	—
4	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—
6	—	—	—	—	—	—	—
7	—	—	—	—	—	—	—
8	—	—	—	3,810,000	1,680,000	—	—
9	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—
14	—	—	—	6,633,600	—	—	—
15	—	—	—	—	—	—	—
16	—	—	—	—	—	—	—
17	—	—	—	—	—	—	—
18	—	—	—	—	—	—	—
19	—	—	—	—	—	212,000	—
20	—	—	—	—	—	—	—
21	—	1,350	—	—	—	—	—
22	—	—	—	—	—	—	—
23	—	—	—	—	—	—	—
24	—	—	—	—	—	—	—
25	—	—	—	—	—	—	—
26	—	—	—	—	—	—	—
27	—	—	—	—	—	—	—
28	—	—	—	—	—	—	—
29	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—
31	425,800	—	—	—	—	—	—
32	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—
34	—	—	—	—	—	—	—
35	—	—	—	—	—	—	—
36	—	—	—	—	—	—	—
37	—	—	—	—	—	54,424	—
38	—	—	—	—	—	—	—
39	—	—	—	—	—	—	—
40	—	—	—	—	—	—	—
41	—	—	—	—	—	—	—
42	—	—	122	—	—	—	—
43	—	—	—	—	—	—	—
44	—	—	—	—	—	—	—
45	—	—	—	—	—	—	—
46	—	—	—	—	—	—	—
47	—	—	—	—	—	—	—
48	—	—	—	—	—	—	—
49	—	—	—	—	—	—	—
50	—	—	—	—	—	—	—
51	—	—	—	—	—	—	499,300
52	—	—	—	—	—	—	—

Leasable Minerals

Federally owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates and sulfur. These minerals are subject to exploration and development under leases, permits, or licenses under the Mineral Leasing Act of 1920, as amended, the Mineral Leasing Act for Acquired Lands of 1947, the Geothermal Steam Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management in cooperation with the Forest Service.

On National Forest System lands open to leasing, the Bureau of Land Management requests Forest Service concurrence in their leasing process. The Forest Service recommends environmental stipulations to protect surface resources; these stipulations are then attached to the lease. Environmental protection measures and stipulations are developed based on environmental analysis (as documented in an environmental assessment or environmental impact statement), and on the management objectives adopted for the land upon which an application has been received.

Leasable Supply. The resource potential for oil and gas is considered to be moderate to low in the Yakutat region. Coal occurrences are classified as lignite and of small extent. Geothermal resources occur in 19 known locations in Southeast Alaska. Potassium, sodium, phosphates, and sulfur do not occur on the Tongass National Forest.

Leasable Demand. Presently there are no leasable mineral applications or pending applications, prospecting permits, or geophysical exploration permits on the Forest. No leasable mineral commodities are presently being produced on the Tongass National Forest. The anticipated demand for leasable minerals on the Tongass National Forest is expected to be low.

Salable Minerals

Salable, or "common variety," minerals are defined by the Materials Act of 1947 and Public Law 167 of 1955. These minerals are sold rather than located or leased. In general, they occur widely and have a low unit value. Salable minerals include petrified wood and common varieties of sand, stone, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits which, although they have economic value, are used for agriculture supply and animal husbandry, building materials, cleaning and abrasive materials, construction, decorative and ornamental arts, and landscaping. Their sale is totally at the discretion of the Forest Service and regulated by 36 CFR 228.

Salable Supply. There is an adequate supply of rock sources with suitable quality (hardness and durability) on the Ketchikan Area. Rock quality is poor on the Chatham and Stikine Areas and material sources are difficult to locate. Sand and gravel sources are scarce throughout the Forest except on the Yakutat Ranger District.

All roads built on the Tongass National Forest require rock for construction because the subgrade soils have poor strength characteristics. Between 1977 and 1988 approximately three percent of the miles constructed were arterial roads, seven percent collectors, and 90 percent local, averaging 15,000 cubic yards per mile, 13,500 cubic yards per mile, and 12,500 cubic yards per mile, respectively, to construct. The total in-service use of rock between 1977 and 1988 was 20,517,208 cubic yards, used to construct 1,627 miles of road. This figure does not include reconstruction, temporary roads, log transfer facilities, and log sort yards. Table 3-34 illustrates the total number of cubic yards of rock used to build timber sale roads between fiscal year 1977 and 1988.

TABLE 3-34
CUBIC YARDS OF ROCK USED FOR ROAD CONSTRUCTION, FY 1977-1988

	Cubic Yards			
Year	*Chatham Area*	*Ketchikan Area*	*Stikine Area*	*Tongass NF Total*
1977[1]	-	-	-	1,954,917
1978	-	-	-	4,518,058
1979	-	-	-	2,233,107
1980	-	-	-	746,055
1981	-	-	-	1,665,346
1982	-	-	-	2,773,048
1983	-	-	-	1,320,138
1984	-	-	-	931,936
1985	-	-	-	754,906
1986	118,863	656,275	639,837	1,414,975
1987	150,475	620,869	117,030	888,375
1988	309,802	542,470	464,071	1,316,344
TOTALS	579,141	1,819,614	1,220,938	20,517,208

[1]Cubic yard figures for the areas from 1977 to 1985 are not available.

Salable Supply. The dominant market for mineral materials is in support of the Tongass National Forest transportation program. The current cubic-yard demands for arterial, collector and local roads are expected to continue. The demand for rock will closely follow the need to construct new timber sale roads.

As the use of Forest roads increases, and both the Alaska State Department of Transportation, and the Federal Highways Department, assume responsibility for road maintenance, the demand for crushed aggregate will increase. It will be expensive to locate crushed rock sites with suitable quality and quantity in the northern part of the Forest. Haul distances will increase. As land exchanges continue, new communities and existing communities will require mineral materials for development of roads, and for foundations for homes, schools and other buildings. The demand for rock from public land in support of these growing communities will increase.

MINERALS

ENVIRONMENTAL CONSEQUENCES

The availability of mineral resources of the Tongass National Forest could be affected by implementation of management prescriptions and Forest-wide standards and guidelines in each alternative. Under any alternative, future exploration and development would be precluded in areas recommended for withdrawal, and the standards and guidelines of certain management prescriptions could affect the cost of conducting exploration, development, and reclamation activities. The restrictions inherent in some management prescriptions could also influence interest in exploring some areas for their mineral resources. Mineral resources, including critical and strategic minerals, that are withdrawn or otherwise restricted will be less available for use by society.

Demand for access to National Forest lands for the purpose of mineral exploration and development is expected to increase over the next ten years. Plans of Operation will continue to be submitted for approval, and regulations under which those operating plans are processed will not change by alternative. Undiscovered and identified mineral resource tracts, characteristics and location of mineral deposits, and Southeast Alaska geology will not vary as a result of implementing any of the alternatives.

The effects of alternatives on mineral resources can be determined by analyzing the relative degree to which management prescriptions economically constrain proposed mineral activities, limit the availability of lands for mineral exploration and development, and reduce the amount of inventoried undiscovered and identified mineral resources available to the public. The management prescriptions have been grouped with respect to their potential effect on access and economic availability of mineral resources. These groups are discussed in this section and displayed in Table 3-35.

Withdrawn: High Operating Costs. The prescriptions requiring complete withdrawal from mineral entry are Wilderness (which includes Recommended Wilderness as shown on the alternative maps), Wilderness National Monument, Non-Wilderness National Monument, Research Natural Areas, Enacted Municipal Watersheds, and Wild Rivers. All of these prescriptions preclude future mineral entry except for claims, leases, or permits with valid existing rights established prior to the date of withdrawal.

If valid existing rights are established, the Forest Service will facilitate mineral development and apply special stipulations and mitigation measures to protect and maintain the surface resources for which the management area was established as much as is practicable. If valid existing rights are not established,

the inventoried quantity, and value, of undiscovered and identified mineral resources are lost to society.

TABLE 3-35
MANAGEMENT PRESCRIPTIONS GROUPED WITH RESPECT TO THEIR EFFECT ON ACCESS AND ECONOMIC AVAILABILITY OF MINERAL RESOURCES.

Mineral Access Group	*Map Symbol*	*Prescription*
Withdrawn: High Operating Costs Valid existing rights will be determined and recognized.	RW	Recommended Wilderness[1]
	WW	Wilderness
	WM	Wilderness Monument
	NM	Non-Wilderness Monument
	RA	Research Natural Areas
	MW	Enacted Municipal Watersheds
	WR	Wild River Segments
Open: High Operating Costs Special stipulations and mitigation measures will be applied. Some areas may be recommended for withdrawal to protect surface resources.	PR	Primitive Recreation
	SP	Semi-Primitive Recreation
	BF	Beach Fringe and Estuary
	OG	Old-Growth Habitat
	EF	Experimental Forests
	SA	Special Areas
	SL	Stream and Lake Protection
	SR	Scenic Rivers
Open: Average Operating Costs	SV	Scenic Viewshed
	RR	Recreation Rivers
	RN	Roaded Natural/Rural Recreation
	VT	Visual-Timber
	TM	Timber Production
	MM	Minerals

[1]Recommended Wilderness is part of the Wilderness prescription. The term is used only for the alternative maps to show "new" vs. existing wilderness.

Open: High Operating Costs. Prescriptions considered to have high operating costs for mineral activities include lands managed as Primitive Recreation, Semi-primitive Recreation, Beach Fringe and Estuary, Old-Growth Habitat, Scenic Rivers, Experimental Forests, and Special Areas. Experimental Forests and Special Areas could result in a recommendation for withdrawal of localized areas where surface resources for which the area was established are vulnerable and cannot be protected by measures other than withdrawal.

All of these management prescriptions are open to future mineral exploration and development and the Forest Service will encourage the orderly development of mineral resources. However, special stipulations and mitigation measures will be applied in an approved plan of operation to protect and maintain the surface resources for which the management area was established as much as is practicable.

As a consequence, exploration, development, and reclamation costs will be higher within these prescriptions than in areas managed for resources that are less sensitive to mineral activities. Therefore, Forest Service surface management prescription standards and guidelines may influence the decision, or interest, of a prospector or mining company in exploring in these areas. Prescriptions with higher operating costs may economically constrain availability of mineral resources, however, they do not preclude exploration or development should demand justify the higher cost of operating in these areas.

Open: Average Operating Costs. Prescriptions considered to have average operating costs have forest management strategies generally compatible with mineral activities. These prescriptions are Scenic Viewshed, Visual-Timber, Roaded natural/Rural Recreation, Recreation Rivers, Minerals, and Timber Production.

All of these management prescriptions are open to future mineral exploration and development and the Forest Service will encourage the orderly development of mineral resources. Mineral activities will not be restricted beyond reasonable precautions to protect the environment and to insure management objectives for the affected lands are met as much as is practicable.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

As previously described, minerals are classified into three categories: locatable minerals, leasable minerals, and salable minerals. By law, the Forest Service manages mineral resource programs that are specific to each mineral category. The consequences of implementing each alternative are discussed by mineral category.

Locatable Minerals

Locatable minerals can be divided into identified resources and undiscovered resources. The baseline inventory of undiscovered mineral resources was not available for inclusion into the environmental analysis. Therefore, an effects analysis of each alternative on access and availability of undiscovered mineral resources was not determined.

Access and availability of identified mineral resources on the Tongass National Forest were analyzed for the years 1954 and 1988, and for Alternatives A-G. Figure 3-19 estimates the access and availability of mineral resources for 1954 and 1988, and displays the effects of alternative implementation on availability of identified mineral resources across the entire Tongass National Forest. Each

pie chart represents 17,001,745 acres or 100 percent of the total acres. In 1954 all lands on the Tongass National Forest were open to mineral entry with average operating costs.

Wild Rivers, Scenic Rivers, Recreation Rivers, Minerals, and Special Area prescription allocation acres are not displayed in the Figure 3-19 pie charts. The amount of lands allocated to these management prescriptions is displayed in Table 2-6. The effect of allocating these prescriptions on access and availability of the identified mineral resources were not analyzed or displayed in Figure 3-19.

EFFECTS OF ALTERNATIVES

Alternatives A and E will increase the amount of land withdrawn from mineral entry from the current (1988) 33 percent to about 45 percent. This represents an increase of 12 percent. Alternative B increases the amount of lands with high operating costs from 25 percent in 1988 to about 43 percent, an increase of 18 percent, and lands withdrawn by one percent. Alternatives C, D, F, and G are similar with respect to their effects on mineral resources and do not depart greatly from percentages depicted in 1988, except they will increase lands withdrawn by approximately 0.3 percent forest-wide.

Identified mineral resources have been inventoried and mapped for the Tongass National Forest. There are 52 mineral activity tracts mapped with approximately 604,989 acres. The estimated, in-place, gross metal value of the identified mineral resources within the mineral activity tracts is 43.8 billion (1988 dollars). Access and economic availability of the identified mineral resources within the inventoried mineral activity tracts were analyzed for each alternative. Figure 3-20 displays the effects of alternative implementation on all mineral activity tracts. Each pie chart represents 604,989 acres or 100 percent.

As with Figure 3-19, Wild Rivers, Scenic Rivers, Recreation Rivers, Minerals, and Special Area prescription allocation acres are also not displayed in the Figure 3-20 pie chart.

FIGURE 3-19
EFFECTS OF ALTERNATIVE IMPLEMENTATION ON AVAILABILITY OF THE IDENTIFIED MINERAL RESOURCES. (100 percent equals 17,001,745 acres) (1954, 1988, Alternatives A-C)

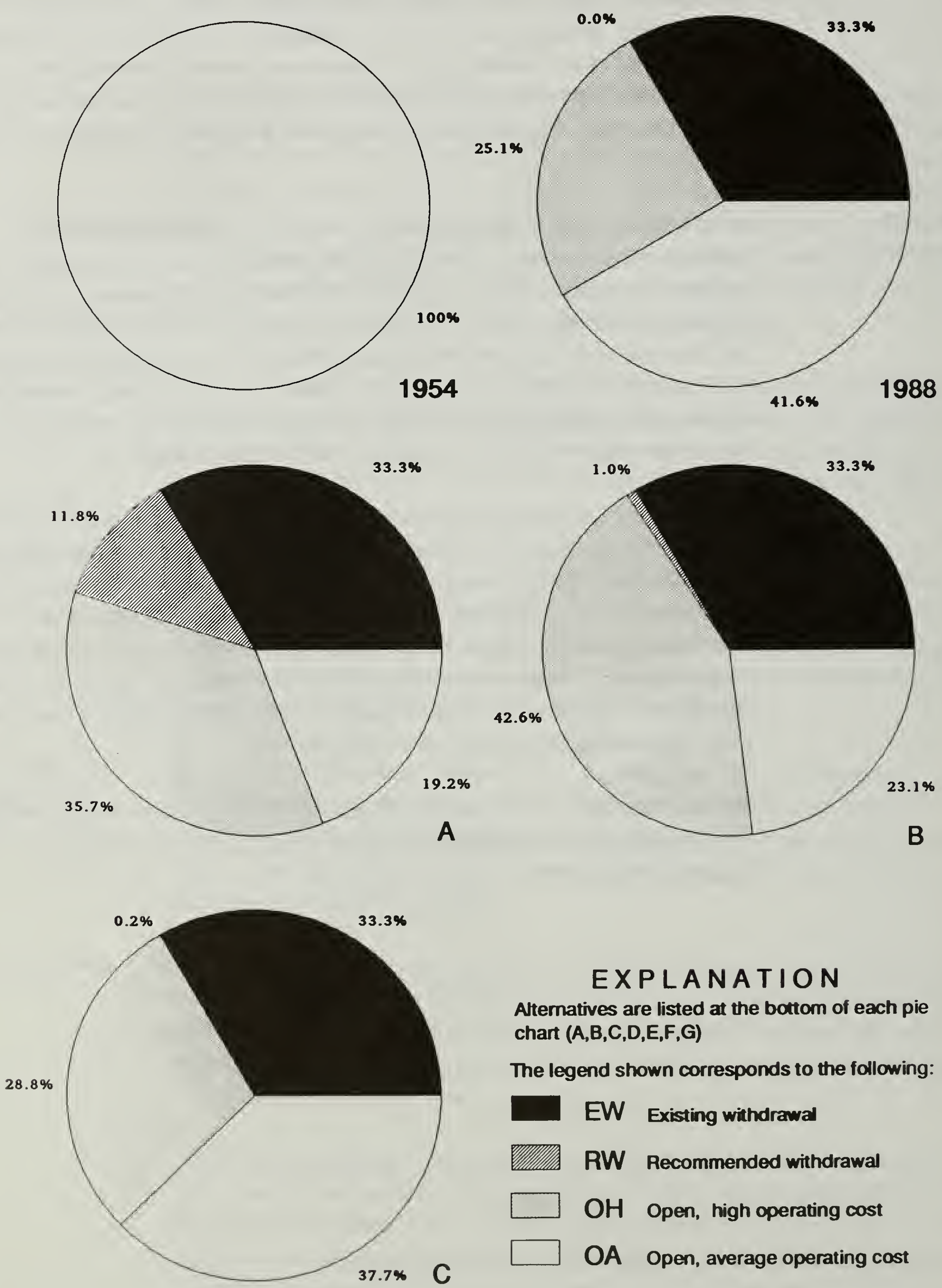
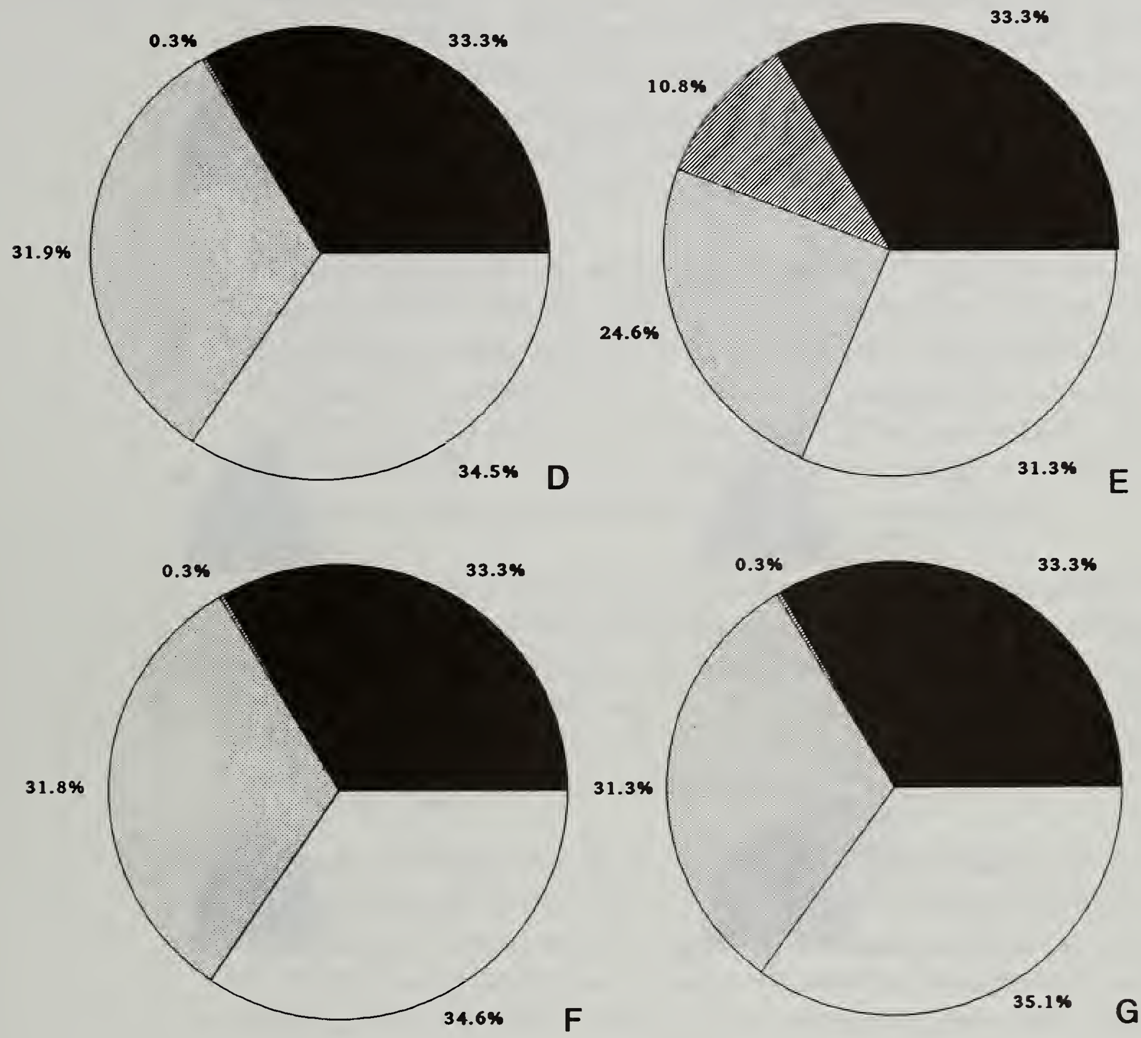


FIGURE 3-19 (continued)
EFFECTS OF ALTERNATIVE IMPLEMENTATION ON AVAILABILITY OF THE IDENTIFIED MINERAL RESOURCES. (100 percent equals 17,001,745 acres) (1954, 1988, Alternatives D-G)



EXPLANATION

Alternatives are listed at the bottom of each pie chart (A,B,C,D,E,F,G)

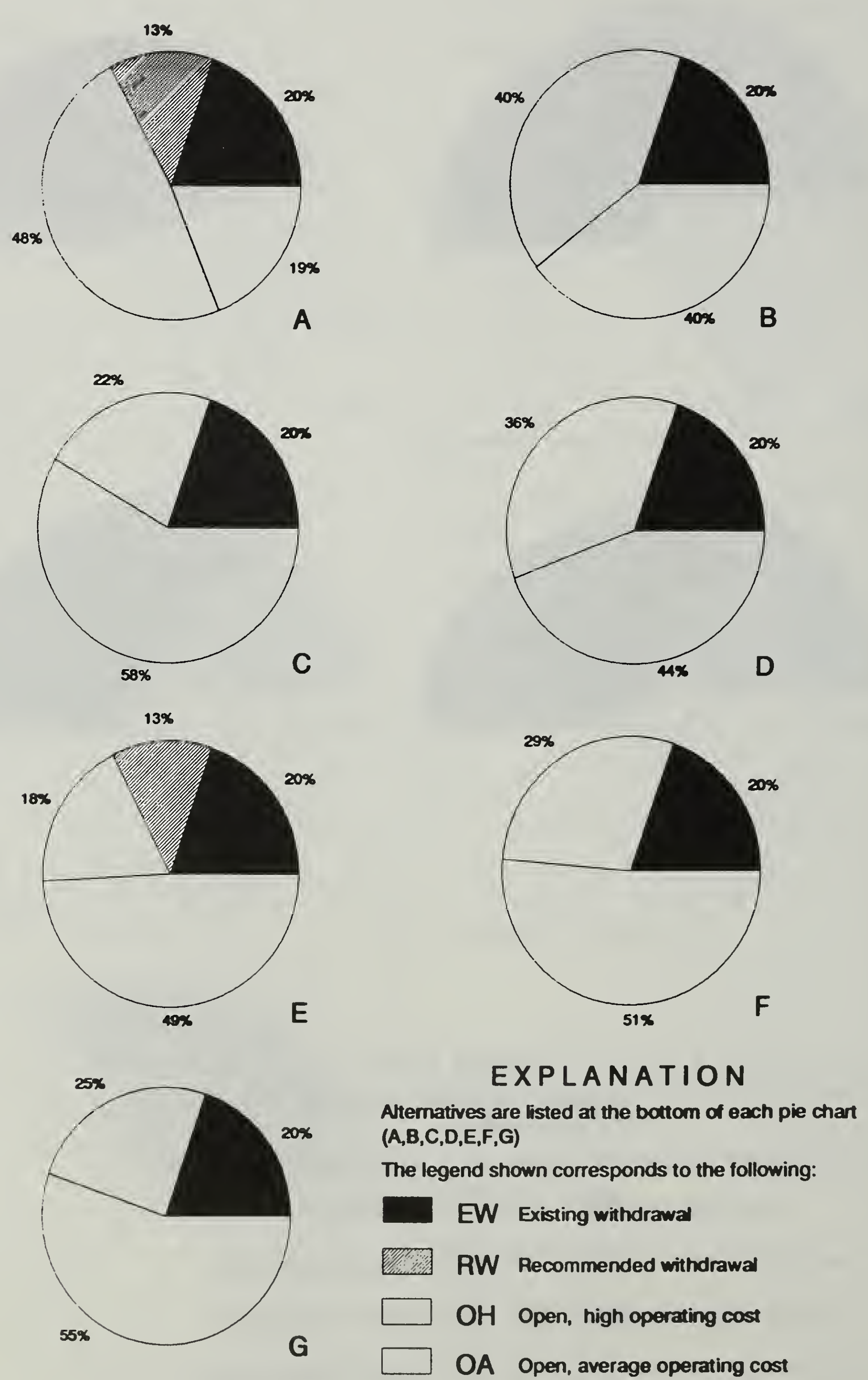
The legend shown corresponds to the following:

- EW Existing withdrawal
- RW Recommended withdrawal
- OH Open, high operating cost
- OA Open, average operating cost

FIGURE 3-20

EFFECTS OF ALTERNATIVE IMPLEMENTATION ON AVAILABILITY OF THE IDENTIFIED MINERAL RESOURCES WITHIN ALL MINERAL ACTIVITY TRACTS.

(100 percent equals 604,989 acres) (Alternatives A-G)



In 1954 all mineral activity tracts were open to mineral entry with average operating costs. Consequently, $43.8 billion (1988 dollars) or 100 percent of the inventoried gross metal values of identified mineral resources on the Tongass National Forest were available to society.

Twenty percent of the inventoried mineral activity tracts are currently withdrawn from future mineral exploration and development. Consequently, an estimated $8.8 billion (20 percent) of the inventoried gross metal values on the Tongass National Forest are no longer available to society. This assumes the total gross metal value of 43.8 billion (1988 dollars) is evenly distributed across all mineral activity tracts (604,989 acres) and valid existing rights were not established.

Alternatives A and E will withdraw an additional 13 percent of mineral activity tracts from future mineral exploration and development. Consequently, an estimated $5.7 billion (1988 dollars) of inventoried gross metal values would be withdrawn. If Alternatives A and E are implemented, a total of about $14.5 billion (1988 dollars) (33 percent) of the inventoried gross metal values of identified mineral resources on the Tongass National Forest would no longer be available to society, assuming valid existing rights were not established.

The Alternative C pie chart can be used to represent access and economic availability conditions for all mineral activity tracts as of 1988. All alternatives will increase lands managed with high operating costs from the current 22 percent displayed in Alternative C. The amount varies from 25 percent in Alternative G, an increase of 3 percent, to 48 percent in Alternative A, a 26 percent increase above the current situation.

Appendix M displays the effects of alternative implementation for each of the 52 mineral activity tracts in the Tongass National Forest, including the mineral activity tracts considered for allocation of the minerals prescription (MM). Ten of the 52 mineral activity tracts were considered for allocation of the Minerals management prescription based on the objectives of each alternative. All ten tracts displayed pre-tax, positive Present Net Value (at zero percent discounted cash flow rate of return). The ten tracts were Bohemia basin (Tract 3), Berners Bay (Tract 4), Juneau Gold Belt (Tract 5), Greens Creek (Tract 9), Chichagof (Tract 16), Kasaan (Tract 41), Union Bay (Tract 43), Tongass Narrows (Tract 45), Quartz Hill (Tract 48), and Bokan (Tract 51). The sum total of all ten mineral activity tracts equals 176,175 acres. Acres allocated to the minerals prescription are displayed on the alternative maps (MM) and in Table 2-6.

Leasable Minerals

Effects of alternative implementation on leasable minerals will not be discussed in detail because the Tongass National Forest does not have leasable mineral activity and leasable minerals were not identified as an issue in public scoping.

Salable Minerals

Salable minerals, or common variety minerals, are used in each alternative. Rock is widely used to construct roads for the forest transportation system. The amount of rock required to construct each mile of road varies by alternative and is displayed in Table 3-36. These figures do not include rock used for reconstruction, log transfer facilities, log sort yards, or temporary roads and assume 13,000 cubic yards of rock are used per mile of constructed road.

TABLE 3-36
MILLIONS OF CUBIC YARDS OF ROCK USED TO CONSTRUCT ROADS BY ALTERNATIVE.

Decade	*A*	*B*	*C*	*D*	*E*	*F*	*G*
1 & 2	2.05	5.72	5.97	7.42	3.32	5.30	5.30
3,4, & 5	0.65	1.72	2.21	2.21	1.08	1.74	1.73
TOTAL	**2.70**	**7.44**	**8.18**	**9.63**	**4.39**	**7.05**	**7.03**

Approximately 13.5 million cubic yards of rock were used in the Tongass National Forest to construct new roads from 1979 to 1988 (Table 3-34). In 1988, 1.3 million cubic yards of rock were used to construct new roads. The quantity of rock used to construct logging roads will decrease in all alternatives compared to the rock used in the ten year period prior to 1988. The biggest rock user, Alternative D, will require 9.6 million cubic yards of rock over 50 years, a decrease of about 30 percent from the rock used in the last 10 year period. Table 3-36 indicates 75 percent of the rock required for 50 years will be used in the first two decades.

OLD-GROWTH FORESTS

AFFECTED ENVIRONMENT

INTRODUCTION

The Forest Service recognizes the many significant values associated with old-growth forests. Biological diversity, wildlife and fish habitat, recreation, visual quality, soil productivity, water quality and high-quality timber are valued components of old-growth forests.

Traditionally, National Forest lands capable of growing commercial volumes of timber have been managed with a focus on individual stands and what they could yield, especially a sustained or increasing yield of timber. The Forest Service recognized the value of old growth in the 1979 Tongass Land Management Plan. With the additional research done in the early 1980's (which is continuing), old growth is being recognized more and more as a special ecosystem, a significant share of which deserves to be protected and managed for posterity.

At the same time, old growth remains a significant resource for production of higly-valued wood products and is closely tied to the economic and social well-being of Southeast Alaska's timber industry. Balancing these important but conflicting values of old growth is an important and difficult planning problem.

Definition. Old-growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.

Old growth is typically distinguished from younger growth by several of the following attributes:

1. Large trees for species and site.
2. Wide variation in tree sizes and spacing.
3. Higher accumulations of large-size dead standing and fallen trees compared to earlier stages.
4. Decadence in the form of broken or deformed tops or bole and root decay.
5. Multiple canopy layers.
6. Canopy gaps and understory patchiness.

Rates of change in composition and structure are slow when compared to younger forests. Different stages or classes of old growth will be recognizable in many forest types.

Sporadic, low to moderate severity disturbances are an integral part of the internal dynamics of old-growth forests. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.

The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Vegetation Data

The Forest's timber type maps are used as the vegetation data base for the Tongass Forest Plan Revision. These maps were completed in 1978, and have been updated since then to account for land status changes and timber harvest activity. The timber type maps were entered into the Revision database to provide spatial data and quantitative analysis capabilities for the Revision. The timber type maps identify the following attributes which are pertinent to old growth identification and quantification: productivity, forest type, size classes (generally synonymous with age classes), strata classes (formerly called volume classes).

Productivity. The timber type maps separate forested lands into two major productivity classes: 1) productive lands, which have been inventoried as being capable of producing 20 cubic feet per acre of useable timber volume per year; 2) low productivity lands, which have been inventoried as not being capable of producing 20 cubic feet per acre of useable timber volume per year. The first category is usually called productive forested lands, and the second category unproductive forested lands. Both productive and unproductive forested lands contain old-growth forests. The unproductive forested lands would primarily be associated with some of the plant associations in the mixed conifer, mountain hemlock, and lodgepole pine series (Martin 1989). The productive forested lands would primarily be associated with plant associations in the western hemlock, western hemlock-Alaska cedar, Sitka spruce, western hemlock-red cedar, and mountain hemlock series (Martin 1989).

Forest Types. Forest types are identified for the productive forest lands, and include the following: hemlock (no distinction is made between western hemlock and mountain hemlock), spruce, hemlock/spruce, cedar (mixed cedar/hemlock stands are not identified in the Revision database; these acres will be included in the hemlock type), red alder, and black cottonwood. Red alder is generally associated with early forest successional stages and is not considered an old-growth forest type. Black cottonwood is also generally associated with early forest successional stages; on some of the mainland rivers it may develop into a persistent stage and may be considered an old-growth cottonwood type.

Size Classes. Size classes identified for the productive forest lands include: currently non-stocked, seedling, pole timber, young-growth sawtimber, old-growth sawtimber. For identifying old growth, only the old-growth sawtimber

size class is used. Following is a discussion of the characteristics of the old-growth sawtimber size class.

> The timber inventory used 150 years as a breakpoint age for separating young growth (less than 150 years) and old growth (greater than 150 years). Even though 150 years was used as the breakpoint age, over 95 percent of the trees sampled in uncut timber stands were greater than 150 years. Most of these stands were well beyond 150 years and were also classed as uneven-aged stands.
>
> There is no timber inventory age category for trees greater than 300 years, as tree ring counting stops when 300 is reached. However, a study of 1,234 trees, 11.0 inches and larger diameter (diameter at breast height, or DBH) from random locations in old-growth mixed hemlock/ spruce stands showed an average tree age at DBH of 282. Because trees in this forest type may take from 7 to 50 years to reach 4 1/2 feet in height (DBH), this may not be the true tree age. Therefore, the actual age of sample trees could have been 289 to more than 332 years. The same study indicated that an average of one tree per three acres is older than 600 years (Planning Record - National Old Growth Task Force).
>
> In summary, most (about 95 percent) of the uncut stands identified in the timber inventory as old growth will be classified as uneven-aged stands and will have trees much older than 150 years.

A few stands identified as old growth on the timber type maps do not have the characteristics of old growth stands. Most of these stands are located near Yakutat (and perhaps a few other places on the mainland) and represent the first trees to occupy sites after glaciers have receded. They are identified as old growth because tree ages are between 150 and 200 years. However, these stands are even-aged, and they do not have many of the structural old growth characteristics associated with other old growth stands in Southeast Alaska. Because they are even-aged, the stands have not developed patchy or multi-layered canopies; they have developed understory shrubs, but not a well-developed understory forb layer, and large diameter snags and downed woody logs are generally lacking.

Strata Classes. Productive forested lands are separated into four classes originally termed volume classes, with the intent of placing productive forested lands into classes based on net volume per acre. The four original volume classes were as follows: volume class 4 = 8,000 to 20,000 board feet per acre; volume class 5 = 20,000 to 30,000 board feet per acre; volume class 6 = 30,000 to 50,000 board feet per acre; and volume class 7 = 50,000 + board feet per acre. The classes were delineated on aerial photos, and recognized relative differences in stand characteristics which could be seen on aerial photos. However, the

differences discernible on aerial photos may not always equate to the net volume per acre of the stand. Therefore, the classes have now been termed strata classes instead of volume classes. Strata A is synonymous with unit class 4, strata B is synonymous with unit class 5, Strata C is synonymous with unit class 6, strata D is synonymous with unit class 7. This situation has recently been evaluated with analysis of the timber type mapping with 515 forest timber inventory plots.

During the 1980's, about 515 forest inventory plots were established to gather statistically reliable information on the timber production potential and stand characteristics for the three Administrative Areas of the Forest. Information gathered from the 515 forest inventory plots, then compared with the volume class information from the timber type maps, indicated that the strata classes on the timber type maps did not always coincide with the volumes from the forest inventory plots. The primary reasons for this variation are:

1. The timber type mapping assigned values for the polygon as-a-whole. A polygon is defined as an area of land (or stand of trees) identified with certain observable characteristics which make it from adjacent areas of land (or stands of trees). The value of the polygon was based on the majority of the contents within its boundary. This meant that if the majority of the polygon was rated high volume and the forest inventory plot fell in a blowdown patch, or in the transition areas between the high volume polygon and one of lesser volume, the resultant forest inventory volume would not be the same as that of the timber type map.

2. The forest inventory plots were not designed to statistically sample the volume in the strata polygons on the timber type maps. Few of the forest inventory plots fell within the higher volume strata on these maps. The result is that it is not possible to reliably conclude that either the forest inventory plots or the timber type mapping is in error.

3. Old-growth forest conditions are naturally heterogeneous. Plots within these strata polygons will show variation due to the natural openings, second growth, multi-storied layering, variations in tree sizes, etc. One plot within a strata polygon containing old-growth forest conditions is not necessarily a representative sample of the entire polygon's characteristics.

The Timber section of Chapter 3 of the Analysis of the Management Situation (Tongass National Forest, January 1990, pp. 3-419 - 3-492) contains additional information discussing the variability of the strata classes, and on-going work

to obtain better information for the timber resources. On-going statistical analysis may show many stand characteristic correlations in each of the strata classes.

Unproductive Forested Land. Unproductive forested land does not have forest types, size classes, or strata classes identified. Unproductive forest lands are identified by the following categories: low productivity due to alder, glacier, high elevation, low site index, muskeg, rock cover, slide zone, willow. Unproductive forested land in the categories of low productivity due to alder, glacier, slide zone, and willow are generally younger stands of trees. Unproductive forested land in the categories of high elevation, low site index, muskeg, and rock cover are generally old-growth stands.

Existing Old Growth Acres

Using the vegetation information available for the Tongass Forest Plan Revision, the following approach was developed to display old-growth forest data for the Tongass National Forest:

1. Use the existing timber type maps, digitized in the Revision database, as the best available forest-wide data source to identify old-growth forests.

2. Use the old-growth size class on the timber type maps for identifying old growth stands, recognizing that most (estimated 95 percent) of the time the stands will be over 200 years old (Samson et al. 1989).

3. Recognize two general productivity classes:

    a. *Unproductive old growth*, capable of producing less than 20 cubic feet per acre of useable timber volume per year. Additional breakdown of unproductive old growth by species or other groupings is not available in the Revision database.

    b. *Productive old growth*, capable of producing 20 cubic feet or more per acre of useable timber volume per year. Recognize four Strata Classes for productive old growth (A, B, C, D), and four species or species groupings (cedar, hemlock, spruce, and hemlock/spruce).

4. Display old growth by five landscape locations: estuary fringe/beach fringe, riparian, upland below 800 feet elevation, upland from 800 to 1,500 feet elevation, subalpine/alpine over 1,500 feet elevation. Definitions for these landscape locations are provided later in this section. Old growth location in the landscape recognizes important ecological functions (Samson et al. 1989). For example, riparian old

growth includes fish habitat, riparian-associated wildlife habitat, specific plant associations, etc.

Evaluations of old-growth stand sizes or patch sizes are not presented here. The Revision database does not permit site-specific evaluations of this kind at this level of detail.

[*Special note*: The old growth acres presented in the following tables will not add up perfectly between all of the tables. Several computer programs were developed to obtain these acreages from the database; these different programs result in small acreage differences. This is a result of digitizing and programming variables.]

Table 3-37 provides a general summary of the old growth acres on the Tongass National Forest. There are a total of 8.8 million acres of old growth, with 3.6 million classified as unproductive conifer old growth, 5.175 million classified as productive conifer old growth, and 8.9 thousand classified as cottonwood old growth.

TABLE 3-37
ACRES OF CONIFER AND COTTONWOOD OLD-GROWTH FORESTS ON THE TONGASS NATIONAL FOREST (Includes Designated Wilderness)

Unproductive Conifer Old Growth (includes shorepine, and other unproductive acres of cedar, western and mountain hemlock, hemlock/spruce, and spruce)	3,627,527 acres
Productive Conifer Old Growth (includes productive cedar, western and mountain hemlock, hemlock/spruce, and spruce)	5,175,967 acres
Cottonwood	8,889 acres
Total Old Growth	8,812,383 acres

Source: Revision database, March 23, 1990.

The Revision database does not contain species information for the unproductive conifer old growth acres. The productive conifer old growth acres can be divided into four species groups, and each species group can be divided into four strata classes. Table 3-38 displays this information. Of the 5.1 million acres of productive old-growth forest, less than one percent is cedar, with approximately 60 percent western and mountain hemlock, 38 percent hemlock/spruce, and two percent spruce.

The four strata classes comprise the following percentages of the 5.1 million acres: Strata A - 50 percent, Strata B - 39 percent, Strata C - 9 percent, and Strata D - 2 percent.

TABLE 3-38
PRODUCTIVE CONIFER OLD GROWTH ACRES BY SPECIES AND STRATA CLASSES.
(Includes Designated Wilderness)

Species	A	*Strata* B	C	D	*Total Each Species*
Cedar	34,912	1,000	-	-	35,912
Western and Mt. Hemlock	1,911,794	995,035	136,601	8,601	3,052,031
Hemlock/Spruce	576,616	984,115	296,722	72,577	1,930,030
Spruce	30,405	44,586	53,647	12,716	141,354
Total Each Strata	2,553,727	2,024,736	486,970	93,894	5,159,327

Source: Revision database, December 19, 1989.

Table 3-39 displays conifer old growth acres and other vegetative conditions on the Tongass National Forest by five landscape locations:

Estuary Fringe/Coast or Beach Fringe. Estuary fringe is defined as the area of land within a 1,000 foot horizontal distance inland from the shoreline around all identified estuary areas in the Revision database. Coast or beach fringe is defined as the area of land within a 500 foot horizontal distance inland from the shoreline along the entire coastline, but not including the area of land already within the estuary fringe so that acres are not double-counted.

Riparian. This is defined as a minimum 100 foot wide zone along both sides of all streams that have been digitized in the Revision database; some stream channel types have a 150-foot-wide zone along both sides; if riparian soil mapping units are wider than the 100- or 150-foot zone, then the width of the soil mapping unit is the width of the zone. The riparian unit does not include any acres already included within the estuary fringe or the beach fringe.

Upland less than 800 feet in elevation. This is defined as all upland areas below 800 feet, but not including any acres already included within the estuary fringe, beach fringe, or riparian units.

Upland from 800 to 1,500 feet in elevation. This is defined as all upland areas from 800 feet to 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.

Subalpine/Alpine. This is defined as all upland areas over 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.

Of the total Tongass acres, 59 percent is forested land (conifer forest). Productive conifer old growth makes up about 30 percent of the total Tongass acres, and unproductive old growth makes up about 21 percent of the total Tongass acres. Productive old growth makes up about 66 percent of the total beach fringe and estuary fringe acres, 43 percent of the total riparian acres, 47 percent of the upland acres below 800 feet elevation, 46 percent of the upland acres between 800 and 1500 feet elevation, and 8 percent of the acres above 1500 feet elevation.

Productive conifer young growth (seedlings, saplings, currently non-stocked, pole, and young saw timber) makes up about 7 percent of the total beach fringe and estuary fringe acres, 8 percent of the total riparian acres, 7 percent of the upland acres below 800 feet elevation, 2 percent of the upland acres between 800 and 1500 feet elevation, and less than 1 percent of the acres above 1500 feet elevation.

Additional Information

Of the 5.175 million acres of old growth on productive forest land, about 1.5 million acres, or 29 percent, are currently preserved in designated Wilderness areas, National Monuments, and Research Natural Areas. Of the 3.6 million acres of productive old growth not preserved, about 3 million acres are tentatively suitable for timber harvesting on a sustained yield basis. The current Forest Plan schedules timber harvesting on about 1.75 million acres of this 3 million.

To help lessen the impact of logging on old growth dependent wildlife species Land Use Designation 3 and Land Use Designation 4 lands, 273,000 acres of commercial forest land was to be retained (not harvested) during the timber rotation under the current Forest Plan. An additional 244,000 acres of commercial forest land was to be managed under extended timber harvest rotations of up to 200 years. These 517,000 acres collectively became known as retention acres.

TABLE 3-39

VEGETATIVE CONDITIONS ON THE TONGASS NATIONAL FOREST IN 1988 WITHIN FIVE LANDSCAPE POSITIONS.

(Includes Designated Wilderness)

	Beach Fr. & Estuary Fr.	*Riparian*	*Upland 800< Ft. Elev.*	*Upland 800 - 1500 Ft. Elev.*	*Upland> 1500 Ft. Elev.*	*Total Tongass*
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Productive Conifer Old Growth Strata A	233,936	166,224	1,088,979	707,578	365,435	2,562,152
Productive Conifer Old Growth Strata B	221,820	174,889	892,335	568,674	173,732	2,031,450
Productive Conifer Old Growth Strata C & D	51,358	72,273	296,079	137,002	25,653	582,365
Total Productive Conifer Old Growth	507,114	413,386	2,277,393	1,413,254	564,820	5,175,967
Unproductive Conifer Old Growth	103,174	172,335	1,386,218	815,062	1,150,738	3,627,527
Productive Conifer Young Growth Seeds/Saps/CNS	33,447	49,667	212,074	39,494	2,481	337,163
Productive Conifer Young Growth Pole Timber	8,145	11,281	39,870	4,217	2,094	65,607
Productive Conifer Young Growth Young Saw Timber	11,522	15,604	105,938	10,978	3,720	147,762
Unproductive Conifer Young Growth	19,553	46,682	207,189	184,417	227,555	685,396
Black Cottonwood	641	3,773	4,475	0	0	8,889
Red Alder	79	40	594	99	60	872
Other Alder, Other Brush, Willow	8,965	84,147	99,435	190,032	566,522	949,101
Natural Grassland	15,796	9,044	14,558	1,380	2,161	42,939
Muskeg Meadow	8,387	14,871	191,523	34,222	9,804	258,807
Slide Zone	1,418	35,246	34,848	108,997	199,049	379,558
Freshwater (Lakes, Ponds)	1,861	33,957	173,754	28,368	29,768	267,708
Alpine Meadow	120	15,182	3,859	40,484	476,538	536,183
Ice/Snowfield(Glaciers)	1,059	3,200	19,917	58,097	1,643,974	1,726,247
Rock	5,082	35,417	30,075	80,702	1,877,412	2,028,688
Other Non-forested Conditions	45,080	7,497	36,270	7,588	13,862	110,297
Other Unclassified Acres	2,646	1,359	12,146	45,453	591,429	653,033
Total Tongass Acres	**774,089**	**952,688**	**4,850,136**	**3,062,844**	**7,361,987**	**17,001,744**

Source: Revision database, March 23, 1990.

[1]Estuary fringe and riparian acres do not include Wilderness areas, because GIS data was not available to identify estuary and riparian acres in Wilderness. The acres which would have been in estuary and riparian areas in Wilderness are included in the upland acres.

There are currently six Research Natural Areas (RNA's) on the Forest which preserve examples of several old-growth forest types:

Pack Creek RNA. Established to represent old-growth hemlock/spruce forest types in northern Southeast Alaska.

Cape Fanshaw RNA. Established to represent old-growth Alaska yellow-cedar and western hemlock forests.

Red River RNA. Established to represent the northern range of old-growth silver fir.

Dog Island RNA. Established to represent a small island with the northern limit of Pacific yew and associated unproductive old growth and low volume mixed conifer old growth in southern Southeast Alaska.

Limestone RNA. Established to represent typical vegetation types common to the Juneau mainland.

Old Tom Creek RNA. Established to represent a cedar/hemlock old-growth forest; also contains riparian spruce old growth.

About 92,924 acres of timber have been harvested from 1979 to 1989. About 337,000 acres of land have been harvested on the Tongass since 1954, which is when the two long term sale contracts began. Most of the timber harvesting has occurred in stands with higher volumes per acre, generally over 30,000 board feet (30 MBF) per acre. The Timber section of this Chapter provides additional information on timber harvesting. Currently there are 5.175 million acres of productive old growth on the Tongass; adding the 337,000 acres that have been harvested since 1954, it is estimated that there were about 5.51 million acres of productive old-growth forest in 1954.

OLD-GROWTH FORESTS

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

This section discusses the effect that each alternative will have on old-growth forests. The environmental consequences will focus on the 5.2 million acres of productive old-growth forest, because these acres are at the center of the public issue involving old-growth forests on the Tongass. Environmental consequences will be displayed in relation to the amount of productive old-growth forest which existed on the Tongass in 1954. This is done to provide a cumulative effects analysis of timber harvesting from the beginning of the two long-term timber sale contracts.

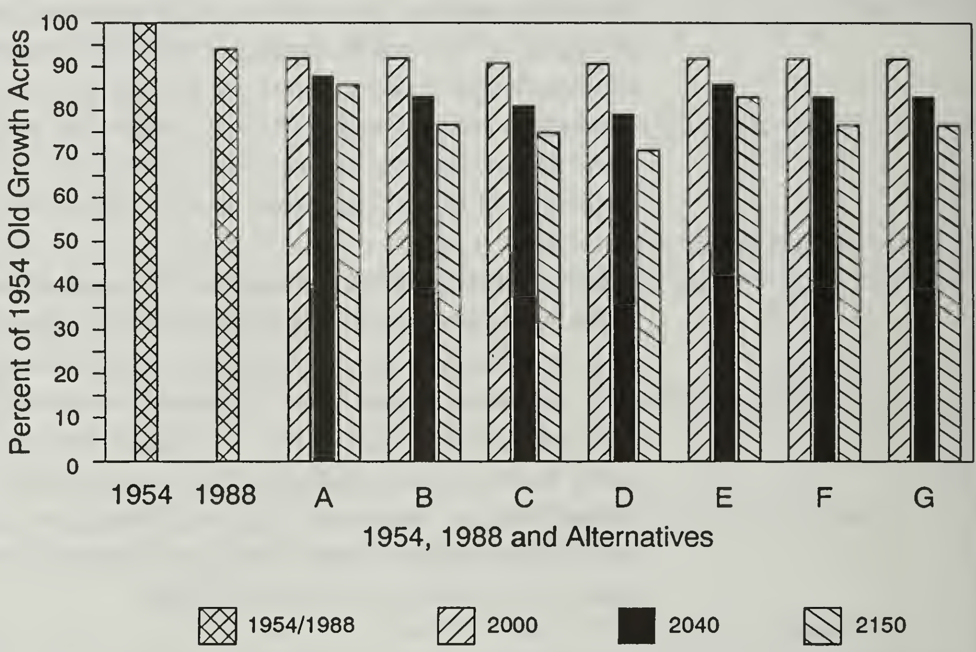
Under all alternatives, the continuation of timber harvesting will result in declines in the amount of remaining old growth. The rate and amount of declines vary with the amount of timber harvested. In approximately 150 years, each alternative will reach a "regulated forest" condition on lands managed for timber harvest. This means that from that time on, the harvest level called for by the alternative could be sustained indefinitely from lands already harvested (second growth). At that time, no additional old growth would need to be harvested to maintain the planned timber supply. The year 2150 in the following analysis can be used to approximate this point in time.

Effects of Alternatives

In 1954, there were an estimated 5.51 million acres of productive old-growth forest on the Tongass. Figure 3-21 displays the percent of 1954 productive old-growth forest acres remaining on the Tongass in 1988 and for each alternative for the years 2000, 2040 and 2150. Table 3-40 displays the estimated changes by the three Administrative Areas of the Forest. The amount of old-growth forest remaining in each alternative is directly related to the amount of timber harvesting associated with that alternative. Alternative D, with the highest amount of timber harvesting, has the lowest amount of old growth remaining. Alternative A has the least amount of timber harvesting and the highest amount of old growth remaining. The amount of productive old growth remaining on the Tongass by the year 2150 for each alternative is: A = 4.7 million acres; B, F, and G = 4.2 million acres; C = 4.1 million acres; D = 3.9 million acres; E = 4.6 million acres.

FIGURE 3-21
(Includes Designated Wilderness)

PERCENT OF 1954 PRODUCTIVE OLD-GROWTH FOREST ACRES REMAINING ON THE TONGASS IN 1988, AND FOR EACH ALTERNATIVE FOR THE YEARS 2000, 2040, AND 2150



Source: Revision Database Q200L2, March - 1990
Q200M, March - 1990
Q200L, March - 1990

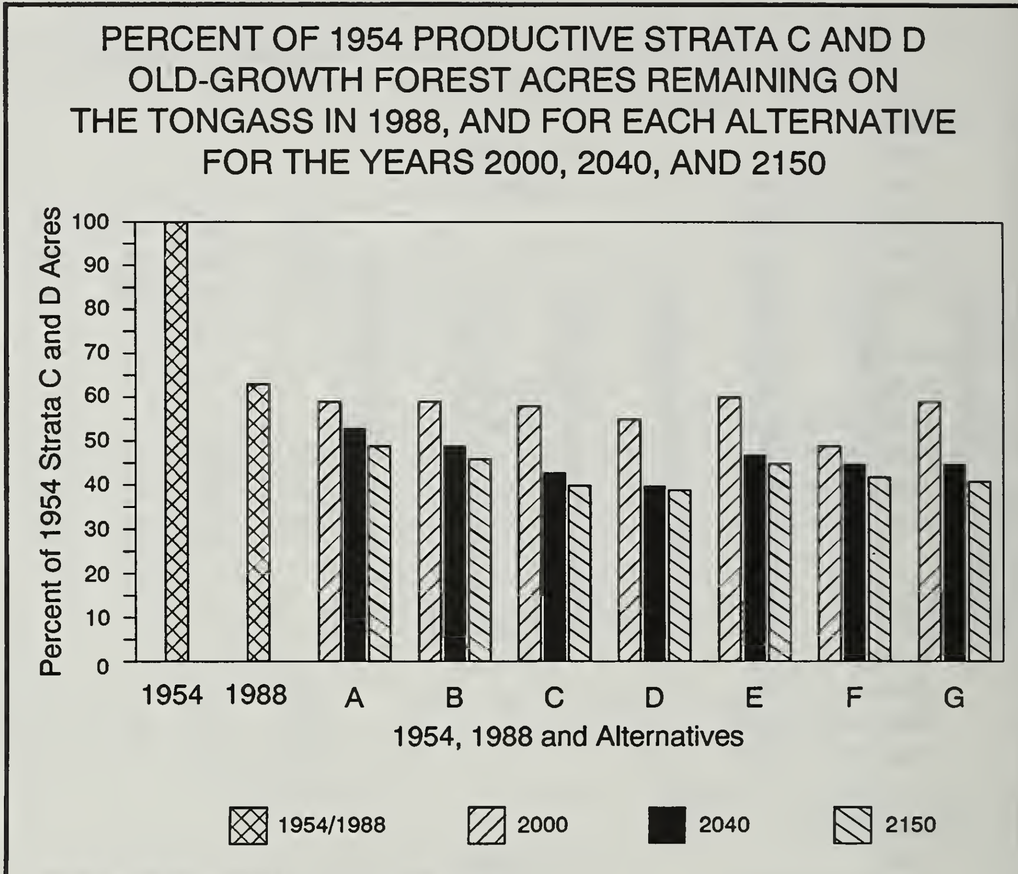
In 1954, there were an estimated 912 thousand acres of productive strata C and D old growth on the Tongass. Figure 3-22 displays the percent of 1954 productive strata C and D old-growth forest acres remaining on the Tongass in 1988 and for each alternative for the years 2000, 2040, and 2150. Table 3-41 displays estimated changes by the three Administrative Areas of the Forest. Alternative D, with the highest amount of timber harvesting, has the lowest amount of strata C and D old-growth remaining. Alternative A has the least amount of timber harvesting and the highest amount of strata C and D old-growth remaining. The amount of productive strata C and D old-growth remaining on the Tongass by the year 2150 for each alternative is: A = 447 thousand acres; B = 419 thousand acres; C = 365 thousand acres; D = 357 thousand acres; E = 410 thousand acres; F = 383 thousand acres; and G = 374 thousand acres.

TABLE 3-40
ESTIMATED CHANGES IN PRODUCTIVE OLD-GROWTH FOREST ACRES COMPARED TO 1954, ON THE THREE ADMINISTRATIVE AREAS FOR EACH ALTERNATIVE (Includes Designated Wilderness)

		Percent of 1954 Acres by Alternative						
	Acres	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954	2.05 Million							
1988 % of 1954	97%							
2000 % of 1954		96	95	95	95	96	95	95
2040		96	89	90	90	96	90	90
2150		96	84	86	86	95	86	86
Ketchikan								
1954	2.13 Million							
1988 % of 1954	92%							
2000 % of 1954		90	89	88	88	89	89	89
2040 % of 1954		85	76	75	74	80	76	76
2150 % of 1954		82	68	68	65	75	70	70
Stikine								
1954	1.33 Million							
1988 % of 1954	94%							
2000 % of 1954		92	91	89	88	91	91	91
2040 % of 1954		86	84	78	73	83	81	81
2150 % of 1954		83	81	71	59	79	76	76
Tongass Total								
1954	5.51 Million							
1988 % of 1954	94%							
2000 % of 1954		92	92	91	91	92	92	92
2040 % of 1954		88	83	81	79	86	83	83
2150 % of 1954		86	77	75	71	83	77	77

Source: Revision Database Q-200L, Q-200E, 3/90; Forplan Analysis 3/90

FIGURE 3-22
(Includes Designated Wilderness)



Source: Revision Database Q200L2, March - 1990
Q200M, March - 1990
Q200L, March - 1990

Landscape Location of Old Growth

Table 3-42 displays the percent of 1954 productive old-growth forest acres remaining on the Tongass within five landscape locations for each alternative.

Beach and Estuary Fringe. Alternatives A and B have no scheduled timber harvesting in the beach fringe and estuary fringe areas and retain the highest amounts of old growth. Alternative D schedules the most timber harvesting and has the lowest amount of old growth remaining. The amount of productive old growth remaining in the beach and estuary fringe by the year 2150 for each alternative is: A and B = 508,000 acres; C = 438,000 acres; D = 373,000 acres; E = 465,000 acres; F and G = 443,407 acres.

TABLE 3-41

ESTIMATED CHANGES IN PRODUCTIVE STRATA C AND D OLD-GROWTH FOREST ACRES FOR THE THREE ADMINISTRATIVE AREAS FOR EACH ALTERNATIVE, COMPARED TO 1954.

(Includes Designated Wilderness)

		Percent of 1954 Acres by Alternative						
	Acres	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954	279,000							
1988 % of 1954	75%							
2000 % of 1954		74	73	73	73	73	73	73
2040 % of 1954		73	68	65	63	69	66	66
2150 % of 1954		72	64	61	62	69	62	62
Ketchikan								
1954	452,000							
1988 % of 1954	62%							
2000 % of 1954		55	56	52	49	56	55	54
2040 % of 1954		47	42	36	32	39	38	37
2150 % of 1954		42	39	32	31	36	34	33
Stikine								
1954	181,000							
1988 % of 1954	53%							
2000 % of 1954		49	47	49	47	49	48	48
2040 % of 1954		42	38	30	27	34	32	32
2150 % of 1954		36	34	26	26	31	29	29
Tongass Total								
1954	912,000							
1988 % of 1954	63%							
2000 % of 1954		59	59	58	55	60	59	59
2040 % of 1954		53	49	43	40	47	45	45
2150 % of 1954		49	46	40	39	45	42	41

Source: Revision Database Q-200M, Q-200E, 3/90; Forplan Analysis, 3/90

TABLE 3-42
ESTIMATED CHANGES IN PRODUCTIVE CONIFER OLD GROWTH ACRES FROM 1954 CONDITIONS FOR FIVE LANDSCAPE POSITIONS. (Includes Designated Wilderness)

		Percent Remaining of 1954 Conditions									
	Acres in 1954	*1988*	*A 2000*	*A 2040*	*A 2150*	*B 2000*	*B 2040*	*B 2150*	*C 2000*	*C 2040*	*C 2150*
Beach & Estuary Fringe											
Strata A	233,936	100	100	100	100	100	100	100	99	97	94
Strata B	221,820	100	100	100	100	100	100	100	98	87	81
Strata C/D	84,985	60	60	60	60	60	60	60	56	47	45
Total	**540,741**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**92**	**85**	**81**
Riparian											
Strata A	166,224	100	100	100	100	100	100	99	100	100	100
Strata B	174,889	100	100	100	100	100	100	99	100	100	100
Strata C/D	119,176	61	61	61	61	61	61	59	61	61	61
Total	**460,289**	**90**	**90**	**90**	**90**	**90**	**90**	**88**	**90**	**90**	**90**
Upland Less Than 800 Ft. Elevation											
Strata A	1,088,979	100	100	99	98	99	93	85	99	95	89
Strata B	892,335	100	99	91	88	96	81	75	96	80	71
Strata C/D	512,860	58	53	46	42	52	41	37	51	36	32
Total	**2,494,174**	**91**	**90**	**85**	**83**	**89**	**78**	**71**	**88**	**77**	**71**
Upland 800-1500 Ft. Elevation											
Strata A	707,578	100	100	99	98	99	93	84	99	95	89
Strata B	568,674	100	99	91	88	96	81	75	96	80	71
Strata C/D	175,212	78	72	63	56	71	55	50	69	49	43
Total	1,451,464	97	96	91	89	95	84	76	94	83	76
Subalpine/Alpine(Over 1500 Ft. Elevation)											
Strata A	365,435	100	100	99	98	99	93	84	99	95	89
Strata B	173,732	100	99	91	88	96	80	74	96	80	70
Strata C/D	27,453	93	85	74	66	85	65	58	84	61	55
Total	**566,620**	**100**	**99**	**95**	**93**	**98**	**88**	**80**	**97**	**88**	**82**

TABLE 3-42 (continued)
ESTIMATED CHANGES IN PRODUCTIVE CONIFER OLD GROWTH ACRES FROM 1954 CONDITIONS FOR FIVE LANDSCAPE POSITIONS.

			Percent Remaining of 1954 Conditions								
D	*D*	*D*	*E*	*E*	*E*	*F*	*F*	*F*	*G*	*G*	*G*
2000	*2040*	*2150*	*2000*	*2040*	*2150*	*2000*	*2040*	*2150*	*2000*	*2040*	*2150*
99	94	82	100	98	97	99	97	94	99	97	95
96	78	68	99	93	90	98	89	83	98	89	83
51	35	34	58	49	48	57	48	46	57	48	45
90	**78**	**69**	**93**	**89**	**86**	**92**	**86**	**82**	**92**	**86**	**82**
100	100	100	100	100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100	100	100	100	100
61	61	61	61	61	61	61	61	61	61	61	61
90	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**	**90**
99	94	83	99	97	95	99	95	91	99	95	91
96	78	68	98	90	84	97	83	74	97	83	73
49	33	32	54	40	38	53	38	34	52	37	33
88	**76**	**67**	**89**	**83**	**79**	**89**	**79**	**73**	**89**	**79**	**73**
99	94	82	99	97	95	99	95	90	99	95	91
96	78	68	98	90	84	97	83	74	97	83	73
66	45	44	73	54	51	71	51	46	71	50	45
94	**82**	**72**	**96**	**89**	**86**	**95**	**85**	**79**	**95**	**85**	**79**
99	94	83	99	97	95	99	95	90	99	95	91
97	79	69	98	89	84	97	82	73	97	82	73
80	55	54	87	67	63	86	63	58	85	63	57
97	**87**	**77**	**98**	**93**	**90**	**98**	**89**	**84**	**98**	**89**	**84**

Riparian. Some harvesting may occur in riparian areas in individual projects following the standards and guidelines appropriate for riparian areas. Tables 3-22 and 3-23 in the Fish section provide additional information. The amount of productive old growth remaining in riparian areas by the year 2150 for each alternative (based on computer model scheduling) is: B = 405,000 acres; all other alternatives = 414,000 acres.

Upland less than 800 feet. All alternatives schedule timber harvesting in upland areas less than 800 feet elevation. The amount of productive old growth remaining by the year 2150 for each alternative is: A = 2.07 million acres; B = 1.77 million acres; C = 1.77 million acres; D = 1.67 million acres; E = 1.97 million acres; F and G = 1.82 million acres.

Upland 800 to 1500 feet. All alternatives schedule timber harvesting in upland areas between 800 and 1500 feet elevation. The amount of productive old growth remaining by the year 2150 for each alternative is: A = 1.29 million acres; B = 1.10 million acres; C = 1.10 million acres; D = 1.04 million acres; E = 1.25 million acres; F and G = 1.15 million acres.

Subalpine/Alpine. All alternatives schedule some timber harvesting in subalpine/alpine acres. The amount of productive old growth remaining by the 2150 for each alternative is: A = 526,000 acres; B = 453,000 acres; C = 464,000 acres; D = 436,000 acres; E = 509,000 acres; F and G = 475,000 acres.

Conclusion

When second-growth timber in the Forest begins to reach harvestable size, the need for old growth to sustain harvest levels will decrease. In approximately 150 years, each alternative will reach a point where no more old-growth forest is required to sustain the desired timber supply. At that time, the remaining old growth could be maintained in perpetuity while also maintaining the level of timber supply. Based on Table 3-40, there will be a range of 71 to 86 percent (3.91 to 4.74 million acres) of the productive old-growth forests remaining at that time (based on the 1954 level of 5.51 million acres). Based on the 1988 amount of 5.18 million acres, the range would be 75 to 92 percent. If the total amount of old growth in the Forest is considered (currently 8.8 million acres), then in the year 2150, at least 82 percent (Alternative D) to 91 percent (Alternative A) of the current amount of old-growth forests of the Tongass would still remain, and could from then on be managed to remain as old growth.

RECREATION

AFFECTED ENVIRONMENT

Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features, including inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual fish and wildlife populations, that provide opportunities for a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places in the world. Southeast Alaska imparts a feeling of vastness, wildness and solitude. Yet, while the area is large, the resident population is small.

Making outdoor recreation opportunities available on National Forest lands is more than providing facilities or recreation sites. The challenge to managers is to identify and understand the variety of client groups that are seeking opportunities to participate in a wide variety of activities. This is particularly important in Southeast Alaska for both residents and visiting tourists. Commercial providers of recreation activities base much of their marketing strategy on particular environmental settings and identified recreation places within those settings.

The character of the recreation opportunities are discussed below under Recreation Supply. The inventory of Recreation Places within the Tongass National Forest is discussed under the Recreation Inventory. This inventory identified some 1,400 recreation places with a total of five million acres. The relationship between tourism (visitors from outside Southeast Alaska visiting Southeast) and outdoor recreation use by residents of Southeast is somewhat different than on many National Forests that are connected to the rest of the Continent by conventional highway systems. This relationship is discussed under Tourism.

The recreation use patterns and traditions by residents of Southeast is discussed under Resident Lifestyle. This section also contains tables showing the distribution of recreation places within community home ranges. And finally, the need for updated and more professionally-oriented information about outdoor recreation settings, users, and the economic importance of both are discussed under Information Needs.

Supply of Recreation Opportunities

The two major Federal land management agencies, the Forest Service and the National Park Service, administer the largest units of public lands available for outdoor recreation. Table 3-43 displays the amounts of available recreation lands in public ownership.

TABLE 3-43
DISTRIBUTION OF PUBLIC LANDS IN SOUTHEAST ALASKA AVAILABLE FOR OUTDOOR RECREATION

	Type of Area	*Acres*
Federal	Tongass National Forest	17,001,745*
	National Park System	3,238,604
State	State Park System	65,463
	State Forests	247,000
	State Wildlife Refuges/ Critical Habitats	8,588
Municipal	Municipal Parks	3,140
Private	Commercial Recreation Areas	4

Source: Outdoor Recreation Alaska SCORP, 1988 (*reflects revised 1990 Tongass NF acreage, Revision Database, 3/90)

While the large acreages of Federal lands are impressive, and contribute greatly to the feeling of vastness and solitude so predominant throughout Southeast Alaska, they are also deceiving in the amount of land area that is actually available and useable for outdoor recreation purposes. The difficult and steep terrain, wetlands, icefields and glaciers, and heavy vegetation confine most of the recreation activities to the accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Some use is made of certain parts of the icefields, and the alpine areas (above tree line) are popular for goat hunting, but access is usually by aircraft. Near the communities, residents and visitors alike use the developed camp and picnic grounds, beaches, and visitor centers.

Community road systems are limited, but heavily used for access to recreation sites and attractions near local communities. These road systems are primarily located near the larger communities of Juneau, Sitka and Ketchikan and Petersburg. There is an extensive road system interconnecting the small communities on North Prince of Wales Island, and another system developing near the community of Hoonah. There is no interconnecting highway system between islands or between communities on the mainland.

Roads exist in other locations where timber harvest has taken place, but if there is no community or interconnecting access to the Alaska Marine Highway System (ferries) there is little recreation use made of them. Where a road system is accessible by the Alaska Marine Highway System, independent tourists and local users from other parts of Southeast use the road systems for recreational purposes.

As may be expected, most outdoor recreation use occurs during the summer and fall months. Most tourist visitation is directly related to the cruiseship schedules which run from May through September. Resident Southeasterners use the coastal areas year-round during periods of favorable weather, but the bulk of the activity centers around the mild spring, summer and fall seasons and the concurrent fishing seasons. During the winter months many residents cross-country ski, snowmobile, and ice skate as conditions permit. Eaglecrest winter sports site located at Juneau is used heavily by the residents of Juneau and more infrequently by residents from other communities. However, many of the other residents travel to Canada where alpine skiing opportunities are better.

The goal of recreationists, both resident and visitor, is to reasonably meet expectations and realize satisfactory experiences as they participate in various outdoor recreation activities. Forest managers cannot provide experiences per se, but they can provide the opportunities for these expectations and experiences to be realized. Recreation opportunities can be broken down into three components: 1) a choice of physical and social settings which contain, 2) opportunities for activities to occur, and 3) a reasonable expectation that satisfactory experiences can be realized. The quality of the setting available and appropriate for the activity plays a key role in the outcome of the visitor's experiences.

Tongass Recreation Inventory

The Forest has the potential to provide a wide variety of recreation settings. The Recreation Opportunity Spectrum (ROS) has been developed to help identify, quantify, and describe these settings. The ROS system portrays the appropriate combination of activities, settings, and experience expectations along a continuum which ranges from primitive to urban.

The Recreation Opportunity Spectrum classes are described below, using seven elements that are considered in the allocation and management of the associated recreation settings. These elements are:

1. *Visual Quality*. A measurement of the degree of modification of the natural landscape characteristics that are apparent within the setting.

2. *Access*. The mode of access required or appropriately used in the pursuit of activities, and the relative ease with which users can travel to or within the setting.

3. *Remoteness*. The perceived separation of the setting from the sights and sounds of other human activity or structures.

4. *Visitor Management*. The degree and appropriateness of the perceived control and regulation of visitor actions. Also, the extent

and appropriateness of services and information provided within the setting.

5. *On-site Recreation Development*. The degree and appropriateness of the recreation facilities provided within the setting.

6. *Social Encounters*. The degree of solitude or social opportunities the setting provides, usually in terms of other parties encountered while traveling within the setting, and/or within sight or sound while camped within the setting.

7. *Visitor Impacts*. The degree of impact both *on* the attributes of the setting and on other visitors within the setting.

These factors are now used to describe the ROS classes, with a comparative summary given in Table 3-44. Figure 3-23 displays current amounts of ROS opportunities Forest-wide.

Recreation Opportunity Spectrum Classes (ROS)

Rural - Visually, alterations to the landform and vegetation may dominate the landscape. Non-recreation activities and structures will be designed and located to not exceed the visual quality objective of Modification in the foreground along sensitive travel routes, or Maximum Modification in the middleground areas.

All methods of access and travel may occur within the management area, but are subject to formal control and regulation for the safety of visitors and protection of structures and resources.

Moderate to high concentrations of people are expected much of the time, and remoteness from the sights and sounds of human activity is not available.

Recreation structures and facilities may be readily evident but are appropriate for the setting and designed to accommodate high levels of use. Information and interpretation facilities may be large and complex.

Visitor-caused impacts are often very noticeable, but are managed to prevent degradation of physical resources through paving and landscape designs which are in harmony with the overall landscape character and appropriate for the site.

Roaded Natural - Visually, alterations to the landform and vegetation remain subordinate to the landscape. Non-recreation activities and structures will be designed and located to not exceed the visual quality objective of Partial Retention. Existing visual conditions ranging from Preservation to Retention are

fully compatible, and emphasizing these characteristics during project design is encouraged.

All methods of access and travel may occur within the management area when compatible with intended activities. Zones of non-motorized use may be. established for resource protection and the safety or comfort of users.

Moderate concentrations of people are expected much of the time, especially on trails and in dispersed areas such as beaches. Remoteness from continuous sights and sounds of human activity is expected.

Recreation structures and facilities are often present and provided for both site protection and user convenience. Facilities are of contemporary but rustic design which harmonizes with the natural setting.

Evidence of visitor use is noticeable, but not degrading to resource elements or exceed established visual quality objectives.

Roaded Modified - Visually, vegetative and landform alterations dominate the landscape. Non-recreation activities and structures are often very evident, but do not exceed the visual quality objective of Maximum Modification. Visual management techniques are applied in the foreground of sensitive travel routes and recreation sites to soften the effects of maximum modification conditions. Less dominant visual quality conditions are fully compatible and emphasizing these characteristics during project design is encouraged.

All methods of access and travel may occur within this management area when compatible with intended activities. Off-highway vehicle use is allowed unless an area is specifically designated closed. Zones of non-motorized use may also be established for resource protection and the safety or comfort of users.

Low concentrations of human-caused sights and sounds in a back-country roaded setting are preferred, and remoteness from continuous sights and sounds of human activity is expected.

Recreation structures and facilities may be present, but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonizes with the backcountry setting.

Evidence of human recreation use is noticeable, but not degrading to resource elements. Site hardening may dominate at campsites and parking areas, but is in harmony with, and appropriate for a back-country roaded setting.

Semi-Primitive Motorized - Visually, alterations are few and appear subordinate to the landscape. Non-recreation activities and structures are designed and

located to meet the visual quality objective of Partial Retention. Existing visual conditions ranging from Preservation to Retention are fully compatible, and emphasizing these conditions during project design and layout is encouraged.

Travel is primarily on trails designed and open to motorized vehicles, or on roads maintained for use by high-clearance vehicles, or by motorboats operating on waterways. Zones of non-motorized use may also be established for resource protection and the safety or comfort of users.

Low concentrations of people are expected and nearby sights and sounds of human activity are rare, but distant sights and sounds may occur. The setting is usually more than 1/2 hour walk or paddle from areas with higher use levels and most large structures. Except during peak periods of use, campsites are seldom within sight or sound of other groups.

Recreation structures and facilities may be present but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use may be noticeable, but not degrading to resource elements. Site hardening may dominate at campsites and boat or aircraft landing areas, but is in harmony with, and appropriate for a back-country roaded setting.

Semi-Primitive Non-Motorized - Visually, alterations are few and appear subordinate to the landscape. Non-recreation activities and structures do not exceed the visual quality objective of Retention. A completely natural visual quality condition is fully compatible and maintaining this condition is encouraged during project design and implementation.

Travel is primarily on trails closed to motorized use or on freshwater lakes and streams using non-motorized boats, or may be cross-country. Use of aircraft, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized management activities may occur unless specifically restricted for safety and/or resource protection purposes.

Low concentrations of people in a roadless back-country setting are expected and nearby sights and sounds of human activity are rare, but distant sights and sounds may occur. The setting is usually more than 1/2 hour walk or paddle from areas with higher use levels and most large structures. Campsites are seldom within sight or sound of other groups, except during peak periods of use.

Recreation structures and facilities may be present but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use is noticeable, but not degrading to resource elements. Limited site hardening, including boardwalk trails, may be used for resource protection, but is in harmony with, and appropriate for a natural appearing back-country setting.

Primitive - Visually, alterations to the landscape are not evident. Non-recreation activities and structures do not exceed the visual quality objective of Retention. A completely natural visual quality condition is fully compatible and maximizing this condition is encouraged during project design and implementation.

Travel is primarily on trails closed to motorized use or on freshwater lakes and streams using non-motorized boats, or may be cross-country. Use of aircraft, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized management activities may occur unless specifically restricted for safety and/or resource protection purposes.

There are no, or very infrequent, sights and sounds of human activity. The setting is located more than 1.5 hours walking or paddling distance from any land-based human developments. Low concentrations of people in a roadless back country setting are expected and nearby sights and sounds of human activity are rare. There are no other groups within sight or sound of overnight campsites.

Recreation structures and facilities are rarely present and are provided primarily for the protection of the site and safety of the visitor. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use is essentially unnoticeable, and not degrading to resource elements. Site hardening is limited to boardwalk trails and necessary boat moorings or bear-proof food caches.

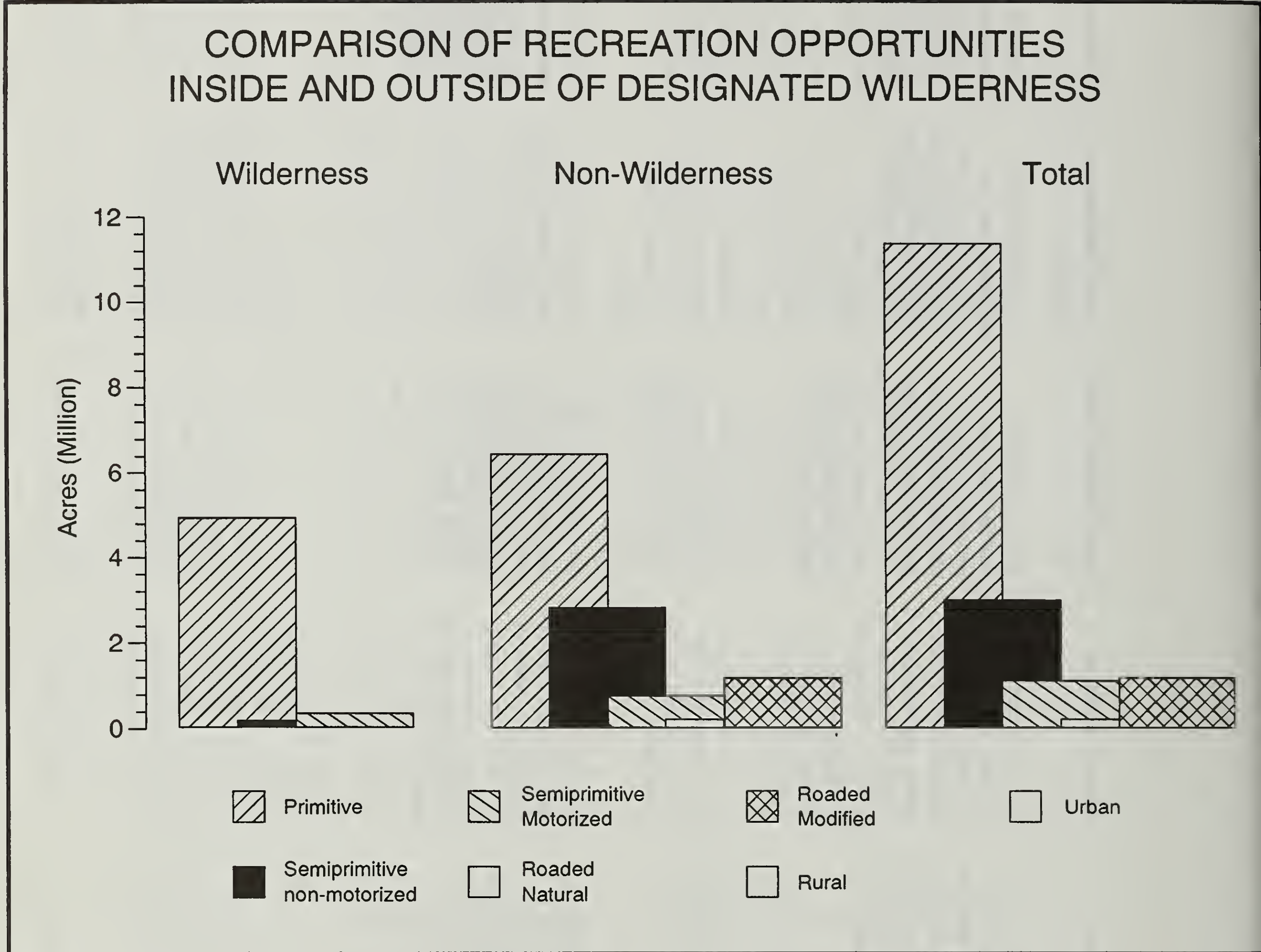
TABLE 3-44
COMPARISON OF ROS CLASSES

	Rural	Roaded Natural	Roaded Modified	Semi-Primitive Motorized	Semi-Primitive Non-Motorized	Primitive
Visual Quality	Alterations to landform and vegetation dominate landscape; non rec activities not to exceed Modification - foreground; Maximum Modification - middleground.	Alterations to landscape subordinate; Non-rec activities, not to exceed partial retention.	Vegetative and landform alteration dominates the landscape; Non-recreational activities and structures often very evident, but do not exceed maximodification.	Alterations few and subordinate to landscape, designed and located to not exceed partial retention.	Alterations few and subordinate to landscape, non-recreation activities and structures designed not to exceed retention.	Alterations to landscape not evident. Non recreation activities and structures do not exceed retention.
Access	All methods of access and travel may occur, but subject to formal regulation.	All methods of access and travel may occur, when compatible with intended activities; Zones of non-motorized use may be established.	All methods of access and travel when needed and compatible with intended activities.	Travel on trails designed for and open to motorized vehicles; Roads maintained for high clearance vehicles; Motorboats operating on waterways, Non-motorized use zones may be established. Zones of non-motorized use may be established, primarily for facility and resource protection.	Travel is cross-country on trails closed to motorized use, or on freshwater lakes and streams using non-motorized boats.	Travel is cross-country on trails closed to motorized use, or on freshwater lakes and streams using non-motorized boats.
Remoteness	Remoteness from sites and sounds of human activity not available or important.	Remoteness from continuous sounds of human activity is important.	Remoteness from continuous sounds of human activity is expected	Nearby sights and sounds of human activity are rare; Distant sounds may occur.	Nearby sounds of human activity are rare; Distant sounds may occur.	No or very infrequent sounds of human activity.
Visitor Management	Moderate to high concentrations of people at one time.	Moderate concentrations of people, especially on trails and in dispersed areas is expected.	Low concentrations of other uses in a roaded setting is preferred.	Campsites seldom within sight or sound of another group.	Low concentrations of people in roadless backcountry.	Very low concentrations of people in roadless backcountry.

TABLE 3-44 (continued)
COMPARISON OF ROS CLASSES

	Rural	Roaded Natural	Roaded Modified	Semi-Primitive Motorized	Semi-Primitive Non-Motorized	Primitive
On-site Recreation Development	Rec structures and facilities may be readily evident, but appropriate for setting, designed for high use levels. Information and interp facilities may be large and complex.	Rec structures and facilities provided for site protection and user convenience. Facilities contemporary but of rustic design. Harmonize with natural setting.	Rec structures and facilities may be present, but are provided primarily for protection of the resource rather than user convenience. Facilities are rustic design which harmonizes with a backcountry setting.	Rec structures and facilities may be present, provided primarily for protection of site rather than user convenience. Facilities, when present are rustic and harmonizes with natural setting.	Rec structures and facilities may be present but provided primarily for protection of site. Facilities, rustic harmonic with the natural setting.	Recreation structures are rarely present, provided primarily for the protection of the site. Facilities, if present, rustic in natural setting.
Social Encounters	Moderate to high concentrations of people at one time.	Moderate concentrations of people, especially on trails and in dispersed areas.	Low concentrations of other users in a backcountry roaded setting is preferred.	Campsites seldom within sight or sound of another group except during peak periods.	Campsites seldom within sight or sound of another group except during peak periods.	No other groups in sight or sound of overnight camps.
Visitor Impacts	Very noticeable but managed to prevent degradation of physical resources.	Visitor use noticeable but not degrading to resource elements nor exceed established visual quality objectives.	Evidence of human use noticeable, but not degrading to resource elements. Site hardening may dominate campsites and parking areas.	Evidence of human use is noticeable, but not degrading to resource elements and appropriate for a backcountry setting.	Evidence of human use noticeable, but not degrading to resource elements.	Evidence of human use essentially unnoticeable. Site hardening limited to boardwalk trails, necessary boat moorings, & bearproof food caches.

FIGURE 3-23



ROS's Use With Recreation Place Inventory

A comprehensive inventory of Recreation Places was conducted on the Tongass National Forest in 1988 and 1989. The inventory considered both the physical and social attributes of the settings. This has been accomplished by applying the ROS system and guidelines.

The majority of the Forest is undeveloped (92 percent is unroaded) and is primarily used for dispersed recreation activities. The exception is the concentrated use areas and facilities, such as visitor centers and campgrounds, in the vicinity of the communities. Viewing scenery and wildlife, boating, fishing, beachcombing, hiking and hunting are the principal dispersed recreation activities participated in by resident users.

Access plays a key role in the nature of how the outdoor recreation resource is used. Obstacles to access, both physical and economic, greatly influence the

patterns and intensities of use throughout the Forest. The distance traveled to participate in outdoor recreation activities is typically limited by either the extent of the available community road system or by the distance capable of being covered by small boats during a day's activities. The use of aircraft for access is limited both by the number of people that can be carried and cost. (A typical round trip flight for a party of four and their equipment to a lake 30 miles from a community with charter air service costs about $300-$400).

Access manifests itself in the pattern of use associated with known protected boat anchorages, boat landings and aircraft landing sites, and the limited road systems. This makes it possible to identify specific "recreation places" which require consideration in both land allocation decisions as well as future project planning. It is these specific places and the quality of the settings that are associated with them that constitute the effective supply of recreation opportunities throughout the Tongass National Forest.

Recreation Inventory

Recreation Places were inventoried throughout the Tongass National Forest using the principles of the ROS and VRM systems and incorporating the principles from Dr. Roger Clark's work (Pacific Northwest Station) on the *Role of Site Attributes in Determining Potential Recreation Sites in Coastal Alaska* (R.Clark, In Press). The result was identification of sites and areas of known use and attractions which represent the land area necessary to reasonably meet the physical and social setting requirements for given ROS standards.

A general Forest-wide inventory of the ROS classification was made in 1989. Using the information from this inventory along with the knowledge of field personnel at the Ranger District level, approximately 1,400 specific recreation places, totalling approximately five million acres (29 percent of the total National Forest Land), have been inventoried (Table 3-45).

TABLE 3-45
TONGASS-WIDE SUMMARY OF RECREATION PLACES

	Number of Recreation Places	*Acres(1,000's)*	*Theoretical Capacity*[1]
Chatham Area			
Inside Wilderness	148	1,114	477
Outside Wilderness	394	5,533	2,138
Ketchikan Area			
Inside Wilderness	66	512	114
Outside Wilderness	421	869	1,113
Stikine Area			
Inside Wilderness	39	276	114
Outside Wilderness	341	686	438
Total Tongass			
Inside Wilderness	253	1,902	705
Outside Wilderness	1,156	3,088	3,688
Tongass-wide Total	1,409	5,000	4,393

Source: Revision Database, Q249, 2/28/90
[1]In thousands of recreation visitor days

These recreation places fall into three general categories according to their principal utility and attraction:

Marine Recreation. The marine setting is the most predominant of the outdoor recreation opportunities. There are 646,000 acres of beach in Southeast Alaska along approximately 11,000 miles of shoreline with thousands of sheltered waterways, inlets, bays and anchorages which provide access (by either boat or aircraft) to most areas with recreation attractions. Twenty nine percent (1.4 million acres) of the inventoried recreation places are primarily related to marine recreation opportunities. While the Forest Service manages the upland areas (above mean high tide), jurisdiction over the intertidal lands and the saltwater fishery is exercised by the State. This means that coordination between both levels of government is necessary to assure consistency in recreation settings and objectives.

A recent survey (Shea 1990) indicates that there is a strong relationship between marine access and wildlife viewing opportunities on the upland areas, and that non-hunting wildlife use primarily accessed by boat is one of the fastest growing commercial recreation businesses in Southeast Alaska.

The family boat is used in the same manner as wheeled recreational vehicles are used in other places. The majority of use in marine recreation places originates in local community boat harbors or launching sites accessed by road systems. Typical day-use occurs within 15-30 mile radius. (Marine Recreation in the Tongass NF, U of Oregon, 1983).

The most popular activities participated in by users of marine recreation places are: beachcombing and hiking, fishing, motorboating, clamming and crabbing (Alaska Public Survey, 1983). Wildlife viewing is a rapidly increasing activity. Other popular activities are hunting onshore and kayaking/canoeing. For overnight users, the most popular activities remain the same with the addition of camping onshore and staying in cabins. However, many people's "favorite place" is further away and takes longer to reach than time allows for one-day outings. While the types of activity patterns are essentially the same at "favorite" and "most often visited" places the reason for differentiating between the two are subtle but important. Reasons given why a place is favorite are remoteness, and various land (setting) characteristics such as beaches, anchorages, and scenery. Reasons given for most often visited places are distinguished by qualities of access, convenience, facilities, and particular activity opportunities (University of Oregon, 1983).

Freshwater Recreation. The Tongass also abounds in freshwater recreation opportunities. There are approximately 42,500 miles of perennial streams and rivers and over 20,000 lakes and ponds within the Tongass National Forest. Twenty five per cent (1.2 million acres) of the inventoried recreation places are primarily related to freshwater recreation opportunities. Streams and some lakes near communities are accessed by the community road system or a combination of roads and trails. Away from the communities, the freshwater environment quickly becomes remote and is accessible only by air, or, in some cases, by small boats.

Fifty-two percent of the identified freshwater recreation place acreage lies within the Primitive ROS class and 21 percent is within the Semi-primitive Non-motorized class. Eighty-one of the 145 Forest Service recreation cabins and shelters on the Tongass National Forest are located on or near freshwater lakes or streams. The limited system of trails from saltwater to inland lakes and along streams is important for recreation access to these sites.

The most sought after settings at freshwater-related recreation places are those that provide opportunities for: (1) getting away (solitude), (2) enjoying natural and scenic settings, (3) fishing for a diversity of species, and (4) good airplane access (USDA Forest Service, Alaska Region Admin. Doc. 159, 1986).

Land-based Recreation. While 2.2 million acres (46 percent) of the inventoried recreation places are primarily related to land-based recreation opportunities, the effective capacity of these areas is generally quite low. Many of these areas are located in the approximately 10 million acres of forested lands, nearly 4.3 million acres of alpine terrain (which contain about 3.75 million acres of icefields and rock) and over 1.5 million acres of muskeg. Some recreation use occurs in all these land areas, but in general, use occurs were access is more available. Where trails are available to access the alpine ridges and mountaintops, people use them.

However, the presence of this vast undeveloped area plays a very important role in providing the perceptions of naturalness and remoteness associated with the more defined marine and freshwater recreation places. Both of these attributes are rated as "very important" by 80-90 percent of the recreation users of the Tongass. When asked about sensitivity to change, natural-appearing settings and solitude were the setting attributes about which people were most sensitive (Clark and Johnson, 1981).

The most popular activities of users of the identified land-related recreation places are hunting, hiking (where there are trails), and driving for pleasure (where there are roads). The principal setting attributes of these places are access, remoteness from communities and developed sites, availability of parking sites for Recreation vehicles (but without facilities), viewing scenery, exploring little-used roads, and freedom of choice of activities. These perceived attributes appear to be much the same on the Tongass NF as in other places in the Pacific Northwest (Clark et al., 1984).

Tourism

For a century now, people have been venturing north to experience the scenic beauty of Alaska's Inside Passage. The actual numbers have been up and down, affected by two World Wars and major or minor economic depressions and booms. But overall, the tourism industry has grown substantially. The most consistent thread one can follow in the development of the visitor trade in Southeast Alaska has been the persistent demand for the natural scenic beauty. The attraction of wild, unspoiled scenery was evident in the writings of John Muir and others in the late 1800's. The Inside Passage has continued to grow in popularity, and has become the "single most highly promoted attraction in all Alaska" (Eric McDowell). It was true in 1879 when John Muir stepped off a mail steamer at Fort Wrangell, and it remains the center focus today as kayakers and cruiseship passengers alike explore the Inside Passage: "What is different about Alaska is, in a word, its *wildness*. What calls tourists is not what western civilization has done, but what it has not done" (Bright, 1985).

From 1975 to 1983 tourism and recreation use increased by 70-100 percent in Southeast Alaska. Cruiseship visitation increased by 115 percent, ferry system

usage increased by 33 percent, and enplaning airline passengers at Juneau increased by 51 percent.

During the summer of 1988 a comprehensive survey of visitors to Southeast Alaska was conducted to measure the economic impact of tourism on the region's economy (Data Decisions Group, Inc., 1988). One of the major findings was that "visitors" (those arriving in Southeast Alaska for other than work or business) spent about $74 million while in Southeast Alaska, establishing that tourism is Southeast Alaska's third largest "industry".

Some of the other findings about tourism in Southeast Alaska were:

* 87 percent (369,200) of all arrivals to Southeast Alaska were "visitors" (as defined above).

* 98 percent of these visitors came from outside Alaska (see Table 3-46).

* Southeast drew an estimated 70 percent of the entire state's pleasure visitors in the summer of 1988.

* There were 34 percent more pleasure visitors in 1988 than in 1985.

* 67 percent of those visitors staying overnight did so aboard cruiseships, 19 percent stayed in hotels or motels, and 13 percent stayed aboard ferries.

Another survey of businesses which provide non-hunting wildlife uses (photography, viewing, study) shows this type of use is increasing rapidly. About 90 percent of the clients of 200 firms which provide this type of recreation service are non-residents of Southeast Alaska. This business activity is growing as much as 33 percent annually, and client expenditures amounted to nearly $43 million in 1989 (Shea, 1990).

The marketing of recreation opportunities by commercial suppliers has important similarities to resident recreation concerns. For example, businesses which provide boat or aircraft access for wildlife viewing and other activities have a low tolerance for the presence of other groups in the same area. The presence of more than two or three other parties in a bay will cause such operators to seek substitute locations. The ability to market Alaska tourism, in part due to the high cost of visiting Alaska, is dependent on meeting customer expectations of seeing and experiencing a vast, awe-inspiring, untamed land and its wildlife.

TABLE 3-46
GEOGRAPHIC ORIGIN OF SOUTHEAST ALASKA PLEASURE VISITORS

Visitor Origin	*Percent of All Visitors*
Alaska	2
Western U.S.	33
California	18
Washington	4
Midwest	18
South	18
East	15
Canada	10
Overseas	4

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, p.59.

Resident Lifestyle and Outdoor Recreation Needs

The distance from Alaska to the lower 48 States and other parts of the world (with the exception of Canada), and the associated travel cost, are major reasons for the difference between resident recreationists and the visitors described in the survey. The survey indicates that visitors are generally older, often purchase package tours, utilize many expensive services, and spend relatively little time in remote settings while in Southeast Alaska. They travel primarily by ship and by air. This is in contrast with most places in the rest of the United States where the two groups are often much less distinctive (primarily due to motor vehicle travel).

Unfortunately, historic reporting of recreation use does not separate visitors and residents, making it impossible to distinguish the effects or values of the two groups from existing data. The State, while maintaining reasonably good records about visiting tourists, has no similar studies about resident impacts, values, desires, needs, or the effect of tourism on resident recreation opportunities.

Local residents of Southeast Alaska seem to value highly the opportunities for remote, uncrowded wildland and marine outdoor recreation. Most of Southeast Alaska is known for its abundant opportunities to "get away from it all." Many residents take advantage of this fact and frequently head for the wilds to boat, fish, hunt, camp, hike, beachcomb, pick berries, and to do the many other things possible in this vast region. Although the number of residents is small, many spend more time out of doors

than their counterparts in the Lower 48. Because of the highly dispersed nature of this type of recreation, much of it is inconspicuous and easily overlooked and information about the amount of dispersed use is difficult to obtain. The most recent information available about the recreation habits and effects of the local resident is the *Alaska Public Survey* (1979).

Because of the nature of the geography and jurisdictional patterns in Southeast Alaska, it is assumed that most dispersed recreation takes place on National Forest lands or the saltwater immediately adjacent to National Forest Lands. The currently available data appears to either underestimate the nature and extent of many recreation activities or overcompensates in inconsistent ways. The net result is that while there is a general intuitive feeling by many that outdoor recreation opportunities and activities are highly important to residents, there is little *recent* documented evidence to clearly support this intuition.

The 1979 Alaska Public Survey did indicate the close attachment many residents have for the region. To quote from the report:

> "Perhaps the most important findings are:
> The importance of the region's natural resource base in providing an attractive setting in which to live and recreate. We found that, for many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource base provided. There is little substantial information to collaborate the belief, especially in the case of residents."
>
> The strong attachment of residents to the region. Southeasterners live in the region longer, are more satisfied with community life there, and are more likely to mention other places in their present region of residence as good places to live than are the residents of Southcentral and Interior Alaska we interviewed."
>
> Both of these tend to distinguish Southeasterners from other Alaskans we interviewed and explain their great concern with natural resource planning for the region's public lands. Because of their strong ties to the region, they are likely to persevere through considerable economic inconvenience, such as might accompany a major change in the region's economy, before they would move elsewhere. Many expressed an interest in pursuing another line of work if necessary to remain in the region."
> (Alaska Public Survey--Residents and Resources, ISER, University of Alaska).

Between 1967 and 1979 resident recreation "demand" changed significantly. The population increased about 1/3 and demand for recreation opportunities followed. There was also an increase in the per capita participation rate. The average southeastener spent twice as much time participating in outdoor recreation activities than in 1967. This indicates a growing interest in these activities, much the same as in the rest of the United States during the same period of time. On the other hand, for the first time the cost of pursuing recreation opportunities (boating and flying) was frequently mentioned as a barrier to participation. Outside of "lack of time" and "weather", the most significant "barrier" to participating in recreation activities in 1979 was stated to be insufficient places *accessible* from their communities for dispersed recreation. As the cost of access to recreation opportunities and places becomes more of a barrier to participation, the location of available sites and places become more important. Other barriers mentioned frequently were "equipment cost" and "need for better information about how and where to go."

In 1967, the lack of facilities was the most mentioned problem. This concern seemed to have been alleviated by 1979. Current public scoping indicates a rising concern about reopening trails, or building new trails near communities.

A sizable number of residents in 1979 indicated they would stop going to their favorite place if any of a number of development-related activities took place there. The two most detrimental changes that people feared would take place were (1) more people (crowding), and (2) new timber harvesting activities.

Tables 3-47 and 3-48 indicate the activities participated in by Southeast Alaska residents in 1978-79.

Changes In Resident Recreation Patterns

Several factors influence total resident recreation demand. Three important ones are: regional population, per capita participation, and recreation travel behavior. These are discussed below.

Regional Population. As a region's population increases, so too should the demand for recreation opportunities in the region. If the pattern of recreation remains constant, the increase should be essentially proportional. In the five decades since 1930 the population of Southeast Alaska has increased more than 20 percent per decade except during World War II. Between 1967 and 1979 the region's resident population increased by about a third to approximately 60,000 people. In the past decade the State as a whole experienced a significant boom/bust economic shift triggered by the world pricing of oil, timber and fish.

TABLE 3-47
MOST POPULAR OUTDOOR RECREATION ACTIVITIES IN SOUTHEAST ALASKA -- 1978-79 (Average annual participation days per capita by Southeastern Alaska adult residents in 1978-79.)

Annual Days	*Activity Per Capita*
Walking, running for pleasure	44.0
Driving for pleasure	27.0
Hiking, beachcombing	25.0
Motorboating	24.0
Playing outdoor sports and games	22.0
Fishing	16.0
Bicycling	6.8
Camping	6.1
Hunting	4.7
Spectator sports	4.5
Canoeing and kayaking	3.8
Swimming, scuba diving	2.2
Summer OHV travel	2.1
Sailing, winter OHV travel	1.7
Flying, downhill skiing	1.6
Cross-country skiing	1.3
Hang-gliding, golf	<1.0

Source: Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.

TABLE 3-48
SOUTHEAST ALASKAN RESIDENT RECREATION TAKING PLACE ON THE COAST [1]

Activity	*% of Days on the Coast*
Motorboating	89
Kayaking, canoeing	74
Sailing	Insufficient data
Fishing	80
Clamming, crabbing	100
Hunting[2]	79
Camping	34
Swimming	64
Hiking, beachcombing	89
All dispersed recreation [3]	75

Source: (Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.)
[1]On the coast refers to recreation activities occurring along saltwater shores.
[2]Assumes all deer and waterfowl hunting is coastal, all other noncoastal.
[3]Includes above activities summer and winter off-road vehicles, travel, flying, cross-country skiing, all of which are assumed to be noncoastal.

The result has been a sharp rise and fall of resident population to a point about equal to the population of 1979. The prognosis for the next decade is for the population of Southeast Alaska to show a slow increase.

Per capita participation. The pattern of people's recreation changes through time; because of this, recreation demand projections are more than simply population projections. Table 3-49 highlights changes in per capita participation by Southeast Alaska residents between 1967 and 1979.

Some of the most popular activities (i.e., hunting, and fishing) exhibited no significant change. Eight activities, snowmobiling, canoeing, cross-country skiing, motorboating, snowplay, downhill skiing, camping and bicycling, experienced increases exceeding 50 percent in the 12-year period. Overall, this shift or substitution appears to favor dispersed, nonconsumptive recreation activities: those requiring a large land or water base per recreationist. This may be indicative of the relative decrease of these opportunities for uncrowded and highly scenic settings elsewhere in the country and many foreign countries.

Over time, the supply of certain recreation opportunities in Southeast Alaska has increased: road systems have expanded, the number of Forest Service recreation cabins and other facilities has increased, and visitor services and tourism marketing have increased. The advent of the ATV is playing a role in how local residents view the construction and management of roads (i.e., there is a strong desire to allow continued use of ATV's for hunting and fishing.) In some cases, supply-induced increases in participation have occurred. This appears to be the case on Prince of Wales and Mitkof Islands where road systems developed for timber harvesting created an opportunity for road-related access to previously inaccessible recreation settings and an opportunity for recreation activities involving wheeled vehicles (something that was relatively rare in those parts of Southeast Alaska). Use increased, but existing capacity now is greater than demand, primarily because the resident population on the islands is low and the Alaska Marine Highway system has a limited capacity to bring outside visitors and their vehicles to the islands.

TABLE 3-49
CHANGES IN THE WAYS SOUTHEAST ALASKANS ENGAGED IN RECREATION ACTIVITIES: 1967-1979

	Percent change in Average Annual Per Capita Days	*Absolute Change in Average Annual Per Capita Days*
Activities Showing Increases		
Snowmobiling	1,530	+1.6
Canoeing	529	+3.2
Cross-country skiing	317	+1.0
Motorboating	149	+12.2
Snow play	144	+2.0
Downhill Skiing	114	+0.8
Camping	110	+3.3
Bicycling	88	+6.3
Walking, running for pleasure, hiking, and beachcombing	52	+14.7
Activities Remaining the Same[1 2]		
Hunting, Fishing, Flying	No Change	No Change
Playing outdoor Games and Sports	No Change	No Change
Activities Showing Decreases		
Driving for pleasure	23	-8.2
Outdoor swimming	33	-2.2

Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.
[1]"Statistical uncertainty in average annual per capita participation days for specific activities is typically 5 to 15 percent for both 1967 and 1979 data, but ranges higher for less frequently engaged in activities. With these uncertainties, we can only say that change in these activities, if any, has been small (20 percent over 12 years). We cannot quantify that change more precisely." (Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.)
[2]This data comes from the 1979 Alaska Public Survey. More recent information on hunting and fishing is available in surveys conducted by the Alaska Department of Fish and Game and is summarized in the sections on Fish and Wildlife in this chapter. Projected long-term demand for hunting and fishing can be found in the section called 'Resource and Demand Analysis' in the Economic and Social Environement portion of this chapter.

Supply-induced participation changes have also been accompanied by additional demand for specific recreation places or facilities for a related activity. With increased opportunities for roaded access and activities came the need for fisherman parking, dispersed campsites, picnic sites, trails to scenic attractions, and additional short access routes to cabin sites and previously inaccessible beaches. Increased tourism has resulted in increased demand for interpretive services, and walking and hiking opportunities near the major communities.

The Alaska Public Survey data for Southeast Alaska seems to show that although there is a rising concern about the costs of accessing desired places, people are not turning away from outdoor recreation activities, but are, in fact, increasing their participation. Public scoping indicates a desire from many people to have

more hiking trails and other dispersed recreation opportunities made available close to communities. Along with this desire is the concern that those recreation places within normal travel distances be protected from adverse change. There is also a part of the population in each of the communities that do not have the financial capability to travel beyond the range of the local road system for outdoor recreation purposes, including fishing.

The non-consumptive use of wildlife appears to be increasingly important to the lifestyle and the economy of Southeast Alaska, yet little is specifically known about this user group, or the important use areas, the target species, the types and amounts of other uses that may compliment or conflict with the use, or the effects of the use on the wildlife species involved. In 1989 the Alaska Department of Fish and Game conducted a survey of 204 known businesses in Southeast believed to serve this user group. The 62 percent response rate indicated that there were about 120 businesses that are at least partially dependent on non-consumptive wildlife uses. In 1989 these businesses served approximately 146,000 clients who spent over $43 million. The survey also indicated that the principal concerns within this relatively new industry are that the current quality may be adversely affected by logging, remote home-sites, increases in small aircraft use, coastal hatcheries and mariculture, and increased use by other recreationists. Currently, the natural appearing landscapes and low levels of encounters with other recreation users contribute significantly to the perceived quality of the experience being realized.

Interestingly, the 1979 Alaska Public Survey did not identify non-consumptive use of wildlife (or wildlife observation) as an activity. This may be an indicator of changing values for both residents and visitors.

Unique Recreation Opportunities

The unique setting that makes the Tongass different from other National Forest recreation opportunities is that of an island and marine environment in close association with major mountain ranges and icefields. More specifically, the Forest also offers vast unmodified landscapes and wildland wildlife and fish habitats unequaled on other National Forests. Because of the island and marine environment there is an abrupt change in character from the relatively small urbanized centers of population to almost immediate wilderness.

Outdoor recreation in Southeast Alaska is much more demanding of skills and proper equipment in order to deal safely with the environment than in most other Forests. More specifically there are newly discovered wild caves with environments of unknown nature; multitudes of rivers and streams which could add new dimensions to the Nation's Wild and Scenic Rivers System; and recreation opportunities that can only be accessed by boat or aircraft. The Region's recreation cabin system and interpretive program on the Marine Highway ferries are extremely popular and highly utilized by resident and visitor alike.

And the opportunity to hunt and view large and, often dangerous, wildlife species is still available on the Tongass. But an underlying concern among many outfitters and guides throughout Alaska is the diminishing primitive, uncrowded settings as more people visit and/or participate in wildland adventure activities.

Information Needs

Perhaps the largest obstacle to comprehensive planning for recreation and Wilderness management on the Tongass National Forest has been the lack of reliable information concerning the use and value of the outdoor recreation resources. The Alaska Public Survey conducted in the late 1970's is the most current information available. Social and economic values have no doubt changed since that time, but to what degree and in what directions can only be surmised.

Better and more up-to-date information is needed to support and guide professional resource allocation and management decisions. Primary needs begin with developing the ability to accurately count and identify the kinds of activities people are engaging in, and concurrently instituting a system to survey users to gain the information necessary to ascertain the relative value and quality associated with opportunities for outdoor recreation, to measure current demand for opportunities and services, and to help make projections of future demands. These two basic kinds of information are closely interrelated. Use information is of little value without the customer satisfaction and values data that gives use numbers meaning; and information about values, needs and satisfaction have little use without quantification data.

The on-going State tourism surveys are not designed to provide information for use in developing strategies which recognize the amount and nature of the role the public lands play in the State's tourism industry, and these surveys ignore the use by, or impacts on, local residents.

A continuation of the Southeast Alaska Pleasure Visitor Research Program designed and conducted in 1988 would be useful to follow the trends in recreation and tourism affecting Southeast Alaska's economy.

Similarly, the Alaska Public Survey of residents could be updated, and perhaps expanded to the same depth and specificity as the TRUCS study of subsistence use in Southeast. Both these surveys, and the results of public scoping, indicate that the opportunities to participate in outdoor recreation by residents are as highly valued and important to the overall lifestyle and social well-being as are subsistence activities. Such information is important to the management of the recreation resource.

RECREATION

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Implementing the integrated management direction contained in the prescriptions will ensure no "net loss" of recreation places. However, some alternatives have the potential to cause significant effects on the physical or social character of the 1,400 inventoried recreation places found on the Forest. Therefore, the analysis and comparison of implementing the alternatives is primarily limited to the degree of change in the condition of the recreation resource settings within the inventoried recreation places.

Home Ranges. Another important aspect of the quality and utility of the recreation resource is the location of the recreation places in relationship to the various communities. The Alaska Public Survey in 1979 identified the importance of the availability and condition of recreation places in the vicinity of communities. These "home ranges" were identified as recreation places lying within 15 to 30 miles of communities. Home ranges of Southeast Alaska's communities are shown in Figure 3-25. For purposes of effects analysis, inventoried recreation places have been classified into two categories: those within a radius of approximately 20 miles from communities, and those outlying recreation places located outside the home ranges. These outlying recreation places also have special importance to residents engaging in multi-day trips, and for commercial outfitters, most of whom market the remoteness and solitude of these places.

Table 3-50 summarizes the effects of each alternative on recreation settings in terms of acres which are subject to change from natural settings to more developed or modified settings. (See explanation of Management Area Prescription Groups at beginning of Chapter.) Three categories are shown: Forest-wide recreation place acres, areas within home ranges, and acres outside home ranges. Figures 3-26, 3-27 and 3-28 visually display these three categories. Acreage of settings within designated Wilderness will not decrease in any alternative. In alternatives A and E wilderness acreage is increased due to the recommended additions to the National Wilderness Preservation System in those alternatives.

The character of the settings is described in terms of Recreation Opportunity Spectrum (ROS) classes. Each ROS class has a consistent set of "indicators" which are used to establish standards & guidelines for the significant setting conditions (see Forest-Wide Direction in Appendix G). It is the collective change in these indicators and the resulting change in ROS classes that is being considered in the following discussions of alternatives.

FIGURE 3-25


TONGASS NATIONAL FOREST
HOME RANGES
GLACIER BAY NATIONAL PARK AND PRESERVE
ENDICOTT RIVER
ADMIRALTY ISLAND NATIONAL MONUMENT
SOUTH BARANOF
GULF OF ALASKA
STIKINE LECONTE
MISTY FIORD NATIONAL MONUMENT
HOME RANGE
30 MILE DIAMETER
DRAFT - JUNE, 1990

TABLE 3-50

MANAGEMENT PRESCRIPTION GROUPINGS WITH RECREATION PLACE ACRES

	1,000's of Acres by Alternative							
Prescription Groups within Recreation Place Categories	*Inventory Present Conditions*	*A*	*B*	*C*	*D*	*E*	F	G
Forest-wide Recreation Place Acres in:								
Wilderness	1,933--{39%}[1]	2,630--{53%}	1,933--{39%}	1,933--{39%}	1,933--{39%}	2,630--{53%}	1,933--{39%}	1,933--{39%}
Natural Setting	2,752--{55%}	2,055--{41%}	2,717--{54%}	1,016--{20%}	1,891--{38%}	734--{15%}	1,248--{25%}	1,235--{25%}
Moderate Development	267--{5%}	267--{5%}	232--{5%}	956--{19%}	203--{4%}	723--{14%}	833--{17%}	812--{16%}
Intensive Development	42--{<1%}	42--{<1%}	112--{2%}	1,090--{22%}	968--{19%}	907--{18%}	980--{20%}	1,014--{20%}
4,995 Total Acres in Recreation Places								
Recreation Place Acres within Community Home Ranges that are in:								
Wilderness	670--{29%}[2]	1,046--{46%}	670--{29%}	670--{29%}	670--{29%}	1,046--{46%}	670--{29%}	670--{29%}
Natural Setting	1,447--{48%}	1,071--{49%}	1,420--{62%}	441--{19%}	1,167--{55%}	313--{14%}	568--{25%}	583--{25%}
Moderate Development	155--{6%}	155--{6%}	142--{6%}	556--{24%}	155--{7%}	404--{18%}	488--{21%}	462--{20%}
Intensive Development	21--{<1%}	21--{<1%}	61--{3%}	627--{27%}	121--{6%}	529--{23%}	568--{25%}	578--{25%}
2293 Total Acres in Community Home Ranges								
Acres Subject to Change from Natural Setting to Development		*No Change*	*7 (3%)*	*804 (35%)*	*92 (4%)*	*604 (26%)*	*701 (30%)*	*695 (30%)*
Recreation Place Acres outside Community Home Ranges that are in:								
Wilderness	1,263--{47%}[3]	1,584--{59%}	1,263--{47%}	1,263--{47%}	1,263--{47%}	1,584--{58%}	1,263--{47%}	1,263--{47%}
Natural Setting	1,305--{48%}	984--{36%}	1,297--{48%}	575--{21%}	724--{27%}	421--{15%}	680--{25%}	652--{24%}
Moderate Development	112--{4%}	112--{4%}	90--{3%}	400--{15%}	48--{1%}	319--{12%}	345--{13%}	350--{13%}
Intensive Development	21--{<1%}	21--{<1%}	51--{2%}	463--{17%}	847--{31%}	378--{14%}	412--{15%}	436--{16%}
2701 Total Acres Outside Community Home Ranges								
Acres Subject to change from Natural settings to Development		*No Change*	*5 (<1%)*	*586 (22%)*	*474 (18%)*	*462 (17%)*	*503 (19%)*	*526 (19%)*

[1]Percent of total Recreation Place acreage
[2]Percent of total Recreation Place acreage within community home ranges
[3]Percent of total Recreation Place acreage outside community home ranges

Source: Revision Database Q249B (3/30/90) and Q249F1 (3/31/90)

FIGURE 3-26

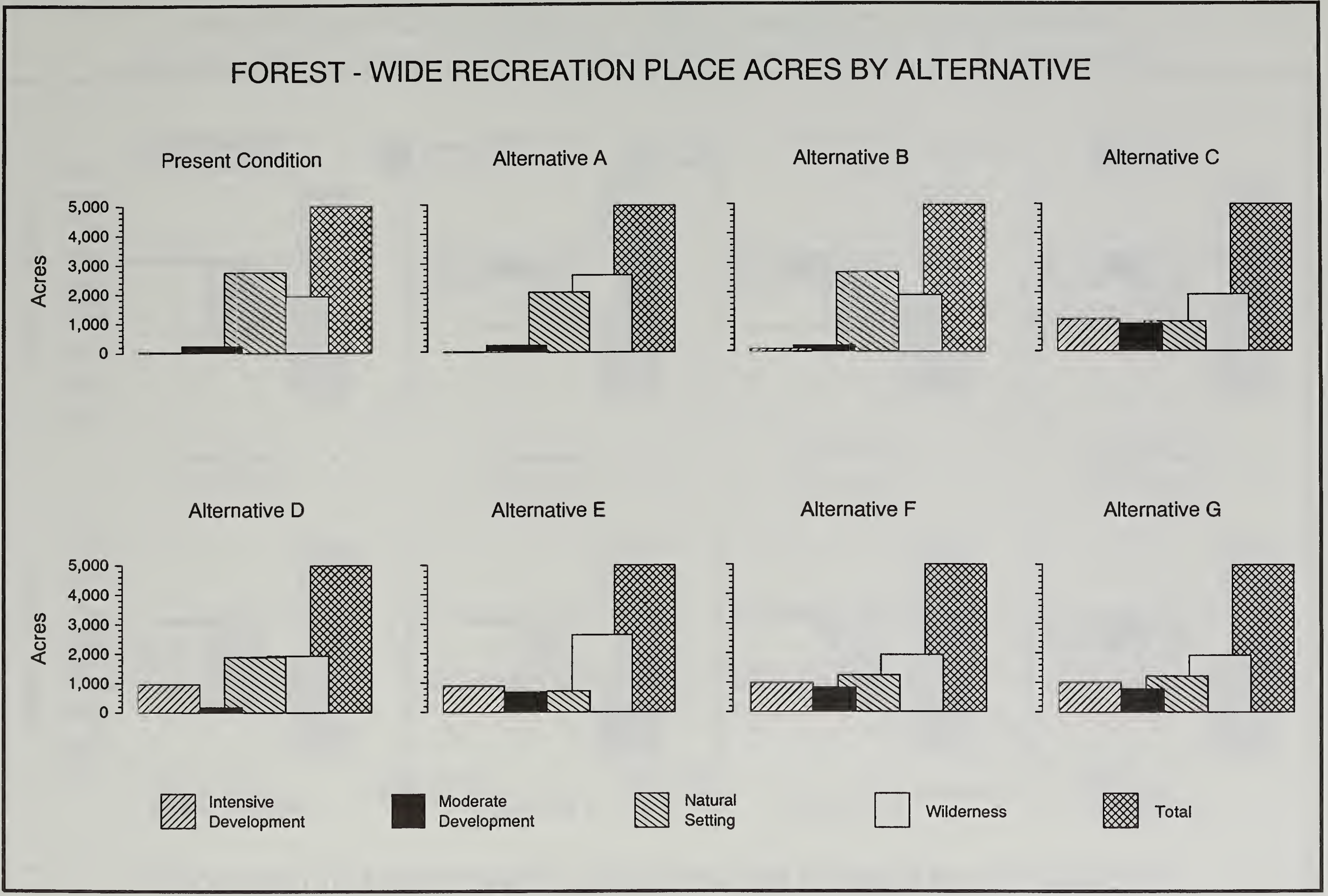
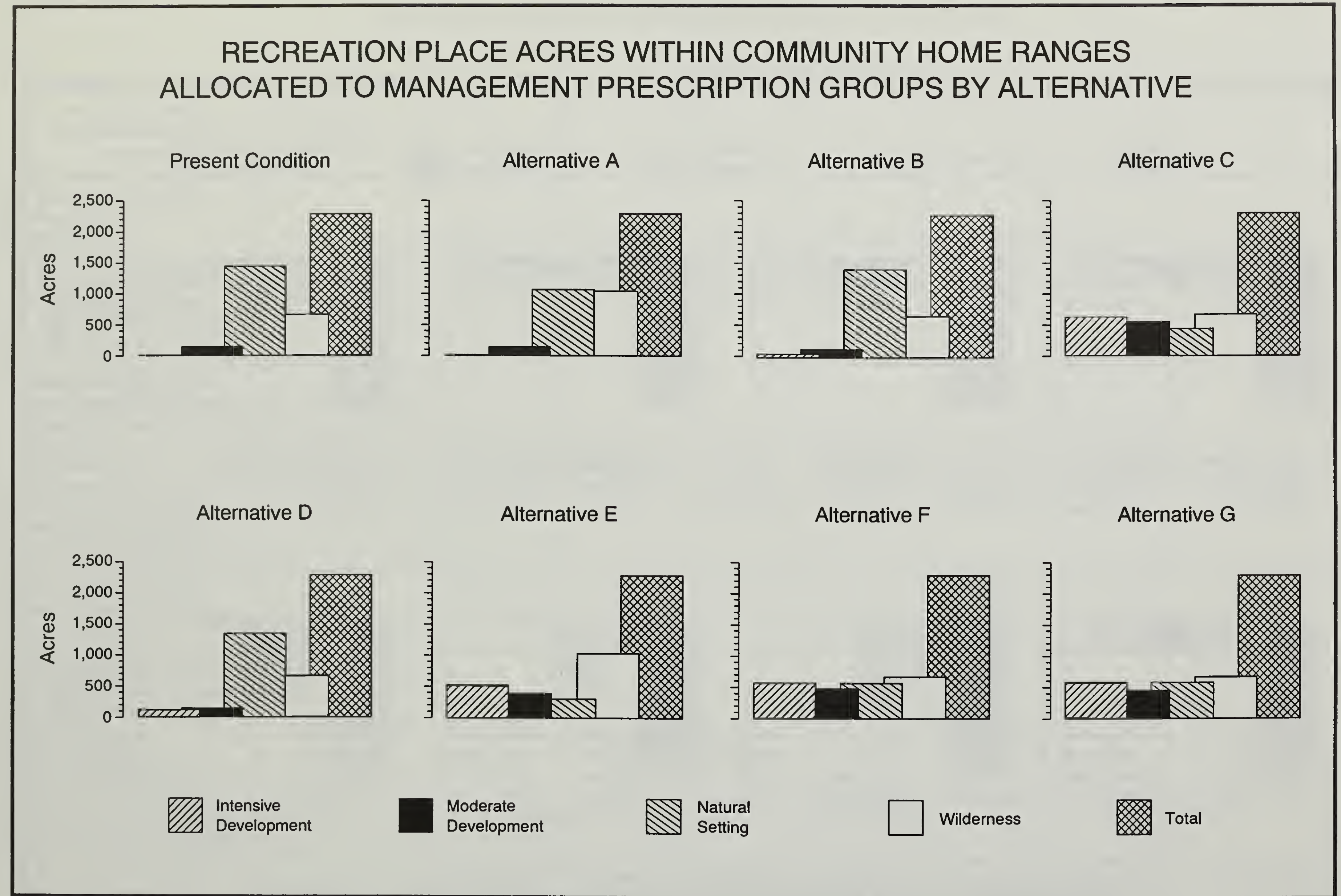
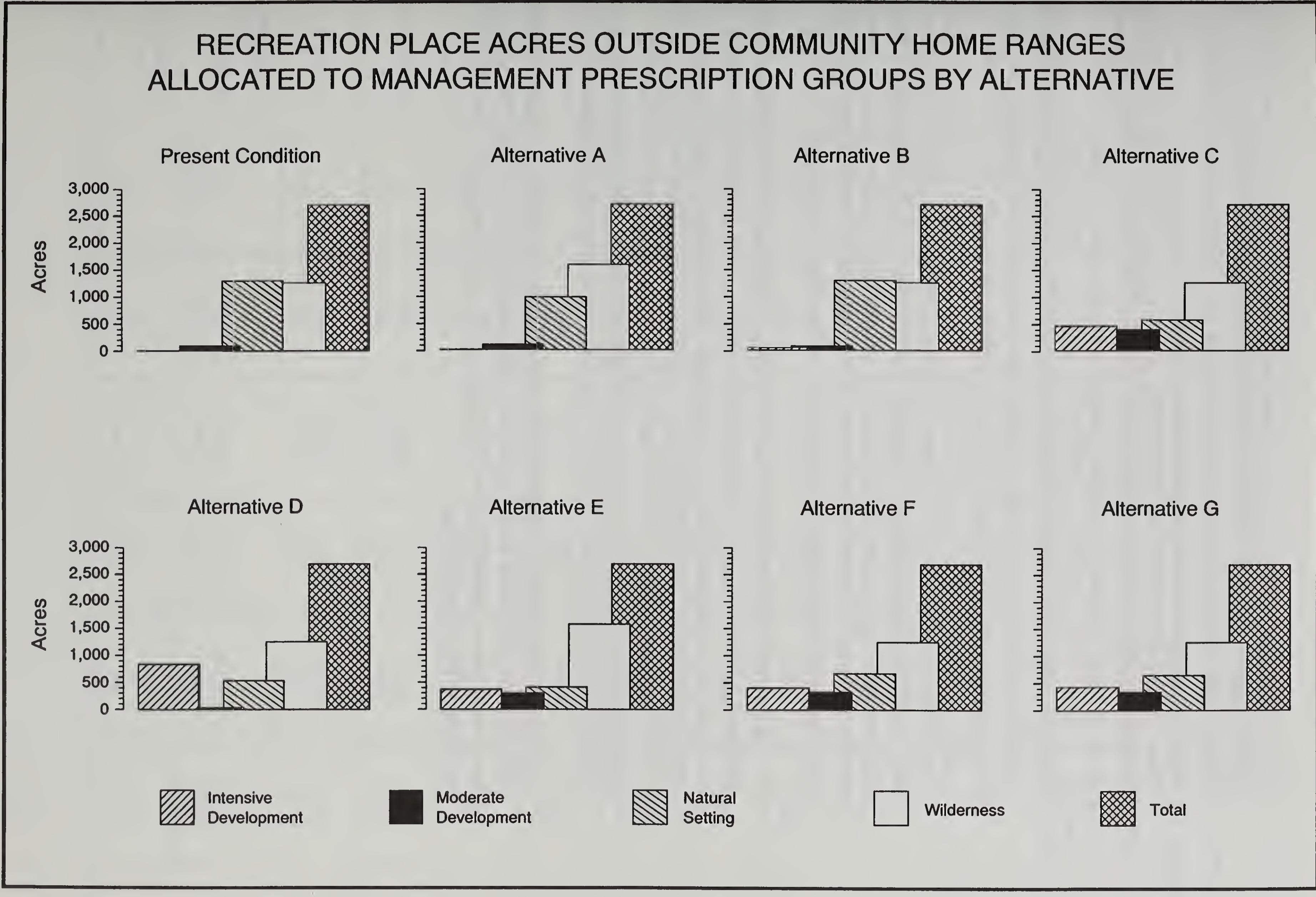

FOREST - WIDE RECREATION PLACE ACRES BY ALTERNATIVE
Present Condition
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G
Acres
5,000
4,000
3,000
2,000
1,000
0
Intensive Development
Moderate Development
Natural Setting
Wilderness
Total

FIGURE 3-27



RECREATION PLACE ACRES WITHIN COMMUNITY HOME RANGES
ALLOCATED TO MANAGEMENT PRESCRIPTION GROUPS BY ALTERNATIVE
Present Condition
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G
Acres
2,500
2,000
1,500
1,000
500
0
Intensive Development
Moderate Development
Natural Setting
Wilderness
Total

FIGURE 3-28



RECREATION PLACE ACRES OUTSIDE COMMUNITY HOME RANGES
ALLOCATED TO MANAGEMENT PRESCRIPTION GROUPS BY ALTERNATIVE
Present Condition
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G
Acres
3,000
2,500
2,000
1,500
1,000
500
0
Intensive Development
Moderate Development
Natural Setting
Wilderness
Total

Table 3-51 shows information about recreation places for specific community home ranges. Most important in this table is the relative magnitude of recreation place acres currently with primitive and semi-primitive settings and suitable timber that would be subject to change when and if the timber is harvested in Alternatives C, E, F, and G. (These alternatives do not have an objective of maintaining the settings of all existing recreation places.) The percentages shown represent the amount of acres suitable for timber harvest compared to the total acreage within recreation places.

Although there is an emerging concern among both land managers and some customer groups about the capacity of the recreation resource base on the Tongass, no attempt at analyzing changes in capacity has been made at this time.

Each of the Recreation Places has been assigned a "theoretical capacity" based on their current ROS classification. Forest-wide this figure is 4.4 million recreation visitor days annually. These serve only as a baseline for later determinations of actual capacity limitations or opportunities. Capacities are better determined during project planning, were the many factors affecting capacity can be identified and analyzed.

Recreation Place Opportunities. Forest-wide, about 39 percent of the recreation place acreage is within Wilderness. About one-third of these acres are within community home ranges, a unique opportunity characteristic of the settings on the Tongass. Over one-half (55 percent) of the recreation place acreage outside Wilderness is in a primitive or semi-primitive condition. When considered together, 94 percent of the existing recreation place acreage is in a natural condition and six percent of the acreage is in a roaded condition. Almost all of the latter is within community home ranges.

There are approximately 1.2 million acres on the Tongass that are in a roaded condition. Only 26 percent of these acres are also in inventoried recreation places. The pattern of future road construction would likely be similar, with about one-fourth of newly roaded areas attracting recreation use.

TABLE 3-51

LIKELIHOOD OF CHANGE WITHIN COMMUNITY HOME RANGE RECREATION PLACES

	Number of Acres and percent, by Alternative, Subject to Change from Primitive and Semi-primitive to Roaded Natural or Roaded Modified ROS Classes						
Community Home Range # of Rec. Pls. & Total Ac.[1]	**A** **No Change**	**B** **(7,000)[2]**	**C** **(804,000)**	**D** **(92,000)**	**E** **(604,000)**	**F** **(701,000)**	**G** **(695,000)**
Angoon *25 Rec. Pls. -- 305,000 Ac.*	*No Change* *0%[3]*	*No Change* *0%*	*9,000* *2%*	*9,000* *2%*	*9,000* *2%*	*9,000* *2%*	*9,000* *2%*
Craig - Thorne Bay *111 Rec. Pls. -- 200,000 Ac.*	*No Change* *0%*	*No Change* *0%*	*150,000* *75%*	*4,000* *2%*	*120,000* *60%*	*128,000* *64%*	*128,000* *64%*
Elfin Cove - Pelican *37 Rec. Pls. -- 242,000 Ac.*	*0* *0%*	*0* *0%*	*99,000* *41%*	*12,000* *5%*	*46,000* *19%*	*70,000* *29%*	*44,000* *18%*
Gustavus *9 Rec. Pls. -- 19,000 Ac.*	*0* *0%*	*0* *0%*	*4,000* *21%*	*1,000* *5%*	*3,000* *16%*	*3,000* *16%*	*3,000* *16%*
Hobart Bay *20 Rec. Pls. -- 107,000 Ac.*	*0* *0%*	*0* *0%*	*102,000* *95%*	*0* *0%*	*35,000* *33%*	*91,000* *85%*	*96,000* *90%*
Hoonah - Tenekee Sprs. *55 Rec. Pls. -- 244,000 Ac.*	*0* *0%*	*7,000* *3%*	*198,000* *81%*	*15,000* *6%*	*176,000* *72%*	*190,000* *78%*	*193,000* *79%*
Hyder *9 Rec. Pls. -- 113,000 Ac.*	*0* *0%*	*0* *0%*	*31,000* *27%*	*12,000* *11%*	*31,000* *27%*	*31,000* *27%*	*31,000* *27%*
Juneau *56 Rec. Pls. -- 205,000 Ac.*	*0* *0%*	*2,000* *1%*	*53,000* *26%*	*10,000* *5%*	*31,000* *15%*	*31,000* *15%*	*31,000* *15%*
Kake *37 Rec. Pls. -- 47,000 Ac.*	*0* *0%*	*1,000* *2%*	*21,000* *44%*	*1,000* *2%*	*22,000* *47%*	*22,000* *47%*	*22,000* *47%*
Ketchikan - Metlakatla - Meyers Chuck *84 Rec. Pls. -- 201,000 Ac.*	*0* *0%*	*0* *0%*	*105,000* *52%*	*8,000* *4%*	*105,000* *52%*	*105,000* *52%*	*105,000* *52%*
Port Alexander - Walter *12 Rec. Pls. -- 13,000 Ac.*	*0* *0%*	*0* *0%*	*0* *0%*	*0* *0%*	*0* *0%*	*0* *0%*	*0* *0%*

TABLE 3-51 (continued)

LIKELIHOOD OF CHANGE WITHIN COMMUNITY HOME RANGE RECREATION PLACES

	Number of Acres and percent, by Alternative, Subject to Change from Primitive and Semi-primitive to Roaded Natural or Roaded Modified ROS Classes						
Community Home Range # of Rec. Pls. & Total Ac.[1]	**A** **No Change**	**B** **(7,000)**[2]	**C** **(804,000)**	**D** **(92,000)**	**E** **(604,000)**	**F** **(701,000)**	**G** **(695,000)**
Petersburg *71 Rec. Pls. – 183,000 Ac.*	*0* *0%*	*7,000* *4%*	*53,000* *29%*	*9,000* *5%*	*37,000* *20%*	*53,000* *29%*	*53,000* *29%*
Skagway - Haines *10 Rec. Pls. – 21,000 Ac.*	*0* *0%*	*0* *0%*	*0* *0%*	*3,000* *14%*	*0* *0%*	*0* *0%*	*0* *0%*
Sitka *77 Rec. Pls.– 103,000 Ac.*	*0* *0%*	*0* *0%*	*56,000* *54%*	*7,000* *7%*	*56,000* *54%*	*56,000* *54%*	*56,000* *54%*
Wrangell *87 Rec. Pls. – 172,000 Ac.*	*0* *0%*	*0* *0%*	*69,000* *40%*	*2,000* *1%*	*69,000* *40%*	*69,000* *40%*	*69,000* *40%*
Yakutat *29 Rec. Pls. – 117,000 Ac.*	*0* *0%*	*6,000* *5%*	*53,000* *45%*	*8,000* *7%*	*19,000* *16%*	*19,000* *16%*	*19,000* *16%*

Source: Revision Database Q249B, 3/30/90; Q249D, 3/16/90; Q249F1, 3/30/90

[1] Many small communities, though not specifically named, fall within the Home Ranges listed. Home Ranges include those Recreation Places that generally fall within a 15 mile radius of communities and their principal road systems.

[2] Number of acres in each Alternative that are subject to change in ROS Class due to allocation to Intensive or Modification Rx's (TP, MM, EF, SV, & RN). Where, when and how much may actually be changed will not be known until specific project planning is completed in accordance with implementin the Forest Plan.

[3]Percent of total Recreation Place acres subject to change from present natural condition settings to modification or intensivelly developed settings.

A map review of the Alaska Pulp Corporation Long-Term Timber Sale Contract Plan for the 1981-86 and 1986-90 Operating Period, and the Ketchikan Pulp Company Long-Term sale Area Plan for the 1989-94 Operating Period, indicates that effects to existing recreation places from currently planned timber harvest will not result in significant changes to the current settings. As these and other currently authorized projects are implemented, the changes in current conditions in recreation places will be recorded, and inventory records periodically up-dated.

At this time, no correlated analysis of how many and what kind of recreation places are included in the corridors of rivers tentatively eligible for inclusion in the National Wild and Scenic Rivers System has been made. This will be done before completion of the Forest Plan Final Environmental Impact Statement. Undoubtedly, there are numerous recreation places associated with wild and scenic river candidates. In the interim period, before any actual designation, recreation places will be managed to maintain the outstandingly remarkable feature(s) of tentatively eligible rivers.

EFFECTS BY ALTERNATIVE

Alternative A - This alternative provides the greatest amount of Primitive and Semi-primitive recreation opportunities both Forest-wide and within community Home Ranges. (See Table 3-50.) It would have twice the acreage of natural settings than available in Alternative C, and only 14 percent of the roaded access opportunities. Conversely, it provides the least amount of road-accessible recreation opportunities, less than 6 percent of all recreation place acreage located within community Home Ranges. This alternative most closely maintains the current outdoor recreation setting conditions Forest-wide.

During implementation of this alternative approximately one million primitive and semi-primitive recreation place acres would be added to designated Wilderness (a 44 percent increase).

Approximately 2,000 miles of new roads would be scheduled for constructed during the next five decades of the planning horizon, with 38 percent (800 miles) being built in the first decade. None of the timber harvest associated with these roads would occur in recreation places.

Alternative B - This alternative provides nearly the same proportion of natural setting opportunities as alternative A, in all recreation places, Forest-wide. The principal difference is that there would be no additional recreation places designated as Wilderness. At the end of five decades the natural setting acreage would more than double that available in alternative C, with only about 14 percent of the roaded access opportunities.

Implementation would schedule approximately 5,700 miles of road to be constructed during the next five decades, with 39 percent (2,200 miles) being scheduled in the first decade. Nearly all these roads and affected acres would be outside recreation places.

Of the 1.1 million acres of suitable timber scheduled for harvest over the five decades only about 7,000 acres would be subject to possible harvest in community home range recreation places and 5,000 acres in other recreation places (less than 4 percent of all recreation place acreage). This acreage, if harvested, would change to roaded access opportunities. Roads for purposes other than timber harvest may be constructed, if appropriate, to enhance recreation opportunities and access.

Alternative C - This alternative has the greatest effect on shifting undeveloped recreation places to developed recreation places. Over time, the alternative could provide the greatest amount of road accessed recreation in Roaded Natural or (mostly) Roaded Modified recreation opportunity classes by the end of five decades. Conversely, the least amount of primitive and semi-primitive recreation settings, outside designated Wilderness, will be available. All settings outside Wilderness will be relatively balanced in terms of acreage, but natural settings may be perceived as more crowded as they become less abundant, and use increases.

During implementation of this alternative approximately 6,300 miles of new roads would be constructed during the next five decades, with 37 percent (2,300 miles) being built in the first decade. Virtually all the scheduled 1.7 million acres of suitable timber would come from recreation places located in the current LUD III and IV allocations. As a result, approximately 804,000 acres containing suitable timber would be harvested within community home range recreation places, and approximately 586,000 acres in recreation places outside home ranges would be harvested over a 150-year period. All recreation places with suitable timber would be in a roaded condition and capable of providing roaded recreation opportunities.

Alternative D - In this alternative natural setting acreage in recreation places would increase about 18 percent over that available in Alternative C, with only about 1/2 the roaded access opportunities. However, acres of roaded access are three times those in Alternatives A and B, with the most change (30 percent) occurring in intensive development prescriptions in recreation places outside home ranges. The character of home range recreation places would remain predominantly natural appearing, with only about a 5 percent increase in roaded opportunities. The eventual harvest of the scheduled 1.5 million acres of suitable

timber in this alternative could increase roaded opportunities by about 25 percent in recreation places outside home ranges over the next five decades.

Timber harvest would call for 7,400 miles of new roads over 50 years with 39 percent (2,900 miles) scheduled during the first decade. Approximately 92,000 acres of suitable timber are in home range recreation places and 474,000 acres in recreation places outside home ranges. This amounts to about 39 percent of the suitable timber acreage as compared to virtually all the scheduled acreage in Alternative C. The principal difference, in Alternative D as compared to C, is that home range recreation places are allocated to management prescriptions which emphasize recreation values and would not be subject to harvest. Recreation places outside home ranges, with suitable timber acreage, and located in current LUD III and IV allocations, are all scheduled for harvest sometime in the next five decades.

Alternatives E, F, and G - The effects of these three alternatives would be essentially the same. All three are, from a recreation standpoint, variations of Alternative C. The exception is that in Alternative E, 697,000 acres of primitive and semi-primitive recreation place settings are included in the 1.8 million acres recommended for addition to the National Wilderness Preservation System. This partially accounts for the 2,000 less miles of road than in Alternatives F and G and the 2,900 less miles than in Alternative C.

During implementation over the next five decades approximately 3,400 to 5,400 miles of road are scheduled for construction in each of these alternatives with an average of 39 percent of that mileage being scheduled in each of the first two decades. This is approximately 2,600 to 4,000 miles in the next 20 years. The final result, by the end of the next five decades, is that about 40-45 percent of the recreation place acreage in all home ranges would be accessed by roads. In all these alternatives, recreation places with suitable timber would be harvested, and in a roaded condition, by the end of five decades.

Table 3-52 shows the total acreage allocated to individual management area prescriptions, Forest-wide, for each alternative. The table also shows the approximate number of Recreation Places, and the acres of Recreation Places that are included within the total are allocated to that prescription. The percentages reflect the relative amount of each prescription that is also within Recreation Places. Each management prescription contains direction to manage the recreation settings to the standards established for their respective ROS classifications and purposes called for in the prescription. While some Recreation Place settings may change over time as a result of implementing management area emphasis, the recreation settings will always be managed to meet the established standards and guidelines for the resulting ROS classification.

TABLE 3-52

MANAGEMENT AREAS WITH RECREATION PLACE ACRES

Prescription	Alternatives						
	A	B	C	D	E	F	G
RW-Recommended Wilderness *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	1,818,213 [1] **(697,243)** *{246}--[38%]*	0 **(000)** *{000}--[00%]*	0 **(000)** *{000}--[00%]*	0 **(000)** *{000}--[00%]*	1,818,213 **(697,243)** *{246}--[38%]*	0 **(000)** *{000}--[00%]*	0 **(000)** *{000}--[00%]*
WW-Wilderness [2] *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*	2,373,510 **(555,082)** *{151}--[23%]*
WM-Wilderness National Monument [3] *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*	3,096,446 **(1,365,426)** *{110}--[44%]*
NM-Nonwilderness National Monument *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*	163,033 **(12,369)** *{8}--[08%]*
RA-Research Natural Area [2] [3] *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	67,684 **(21,333))** *{27}--[32%]*	106,799 **(30,205)** *{36}--[28%]*	69,038 **(22,248)** *{25}--[32%]*	35,302 **(1718)** *{5}--[05%]*	37,934 **(8,313)** *{13}--[22%]*	68,998 **(22,208)** *{25 }--[32%]*	63,342 **(18,993)** *{23}--[30%]*
PR-Primitive Recreation *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	3,619,189 **(628,486)** *{192}--[17%]*	4,552,217 **(1,038,253)** *{293}--[22%]*	3,139,929 **(287,251)** *{123}--[09%]*	1,528,474 **(475,152)** *{125}--[31%]*	2,904,524 **(240,935)** *{91}--[08%]*	3,800,265 **(573,852)** *{205 }--[15%]*	3,758,312 **(619,539)** *{212}--[16%]*
MW-Municipal Watersheds *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	9,733 **(9,254)** *{10}--[95%]*	9,733 **(9,254)** *{10}--[95%]*	9,733 **(9,254)** *{10}--[95%}*	9,733 **(9,254)** *{10}--[95%]*	9,733 **(9,254)** *{10}--[95%}*	9,733 **(9,254)** *{10}--[95%}*	9,733 **(9,254)** *{10}--[95%}*
OG-Old Growth *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	994,043 **(376,351)** *{34}--[38%]*	337,735 **(156,291)** *{173}--[46%]*	595,717 **(230,313)** *{94}--[39%]*	51,340 **(240)** *{1}--[<1%]*	441,002 **(146,894)** *{64}--[33%]*	544,421 **(202,898)** *{84 }--[37%]*	528,750 **(190,263)** *{81}--[36%]*
SP-Semi-primitive Recreation *(Recreation Place Acres)* *{# Pls.}---[% of Rx All.]*	1,005,395 **(816,635)** *{450}--[81%]*	1,664,390 **(1,172,117)** *{569}--[70%]*	640,537 **(345,101)** *{357}--[54%]*	3,359,426 **(1,255,930)** *{409}--[37%]*	439,140 **(238,435)** *{301 }--[54%]*	603,721 **(324,761)** *{348 }--[54%]*	561,556 **(281,558)** *{346}--[50%*
(Sub-total PR, SP Recreation Place Acres) *{# Pls.}---[Rec. Pl. Ac. in Rx's as a % of Total* ***Non-Wilderness*** *Rec. Pl. Acerage on the Tongass (3,087,728)]*	**(1,445,121)** *{642}---[47%]*	**(2,210,370)** *{862}---[72%]*	**(632,352)** *{480}---[20%]*	**(1,731,082)** *{534}---[56%]*	**(479,370)** *{392}---[16%]*	**(776,750)** *{553}---[25%]*	**(901,097)** *{558}---[29%*

TABLE 3-52 (continued)

MANAGEMENT AREAS WITH RECREATION PLACE ACRES

Prescription	Alternatives						
	A	B	C	D	E	F	G
EF-Experimental Forest *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	48,836 (11,003) *{9}--[22%]*	71,770 (12,958) *{12}--[18%]*	17,199 (10,303) *{6}--[60%]*	17,199 (10,303) *{6}--[60%]*	17,199 (10,303) *{6}--[60%]*	17,199 (10,303) *{6}--[60%]*	17,199 (10,303) *{6}--[60%]*
SV-Scenic Viewshed *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	898,706 (90,235) *{132}--[10%]*	1,042,958 (96,700) *{128}--[09%]*	570,714 (All Rec. Pl's. In Rec. Rx's)	209,059 (All Rec. Pl's. In Rec. Rx's)	479,775 (All Rec. Pl's. In Rec. Rx's)	527,412 (All Rec. Pl's. In Rec. Rx's)	516,996 (All Rec. Pl's. In Rec. Rx's)
VT-Visual-Timber *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	1,266,856 (81,600) *{136}--[06%]*	574,847 (29,415) *{52}--[05%]*	1,006,843 (All Rec. Pl's. In Rec. Rx's)	161,651 (All Rec. Pl's. In Rec. Rx's)	815,256 (All Rec. Pl's. In Rec. Rx's)	946,982 (All Rec. Pl's. In Rec. Rx's)	959,593 (All Rec. Pl's. In Rec. Rx's)
RN-Roaded Natural/Rural Recreation *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	77,118 (74,950) *{103}--[97%]*	85,600 (83,432) *{114}--[97%]*	833,770 (831,688) *{497}--[100%]*	129,784 (123,613) *{117}--[95%]*	631,139 (623,175) *{431}--[99%]*	722,741 (723,962) *{473 }--[100%]*	703,476 (699,904) *{474}--[99%]*
TM-Timber Production *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	1,097,337 (42,378) *{96}--[04%]*	2,262,260 (112,295) *{147}--[05%]*	3,998,688 (1,089,686) *{648}--[27%]*	5,340,009 (968,121) *{667}--[18%]*	3,363,589 (907,135) *{565}--[27%]*	3,679,245 (980,281) *{607 }--[27%]*	3,792,102 (1,014,506) *{625}--[27%]*
MM-Minerals *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	4 ( ) *{000}--[00%]*	5 ( ) *{000}--[00%]*	6 ( ) *{000}--[00%]*	7 ( ) *{000}--[00%]*	6 ( ) *{00}--[00%]*	6 ( ) *{000 }--[00%]*	8 ( ) *{000}--[00%]*
BF-Beach Fringe and Estuary *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	383,147 (203,154) *{601}--[53%]*	565,485 (311,202) *{776}--[55%]*	187,849 (121,648) *{345}--[65%]*	229,610 (148,169) *{535}--[64%]*	138,019 (90,121) *{288}--[65%]*	179,250 (115,484) *{332 }--[64%]*	178,345 (115,241) *{332}--[65%]*
SL-Stream and Lake Protection *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	82,478 (9,018) *{128}--[11%]*	94,940 (9,518) *{136}--[10%]*	298,717 (114,148) *{656}--[38%]*	263,579 (69,068) *{480}--[26%]*	244,357 (89,831) *{551}--[37%]*	268,767 (98,636) *{607 }--[37%]*	279,333 (102,278) *{607}--[37%]*
SA-Special Areas *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	0 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	0 ( ) *{00}--[00%]*	0 ( ) *{000 }--[00%]*	0 ( ) *{000}--[00%]*
WR-Wild Rivers* *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	97/1,259 ( ) *{000}--[00%]*	46/648 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	19/329 ( ) *{000}--[00%]*	0 ( ) *{00}--[00%]*	0 ( ) *{000 }--[00%]*	0 ( ) *{000}--[00%]*
SR-Scenic Rivers* *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	12/148 ( ) *{000}--[00%]*	11/132 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	5/63 ( ) *{000}--[00%]*	0 ( ) *{00}--[00%]*	0 ( ) *{000 }--[00%]*	0 ( ) *{000}--[00%]*
RR-Recreation Rivers* *(Recreation Place Acres)* *{# Pls.}—[% of Rx All.]*	19/157 ( ) *{000}--[00%]*	14/159 ( ) *{000}--[00%]*	0 ( ) *{000}--[00%]*	5/39 ( ) *{000}--[00%]*	0 ( ) *{00}--[00%]*	0 ( ) *{000 }--[00%]*	0 ( ) *{000}--[00%]*

TABLE 3-52 (continued)

MANAGEMENT AREAS WITH RECREATION PLACE ACRES

Prescription	Alternatives						
	A	B	C	D	E	F	G
(Total PR, SP, RN Rx Allocated Acres) *{# Pls.}—[Rec. Pl. Ac. in Rx's as a % of Total* **Non-Wilderness** *Rec. Pl. Acerage on the Tongass (3,087,728)]*	(1,520,071) {745}—*[49%]*	(2,293,802) {976}—*[74%]*	(1,464,040) {977}—*[47%]*	(1,854,695) {651}—*[60%]*	(1,102,545) {823}—*[36%]*	(1,500,712) {1026}—*[49%]*	(1,601,001) {1032}—*[52%]*

Source: Revision Database Q249C, 3/17/90; Q249C1, 3/22/90)

* Number of river segments/miles of river

[1] 58,719 acres are RW-Recommended Wilderness and RA-Research Natural Area.

[2] 30,093 acres are WW-Wilderness and RA-Research Natural Area.

[3] 85,949 acres are WN-Wilderness National Monument and RA-Research Natural Area.

[4] 15,287 acres overlap with other Management Area Prescription allocations.

[5] 138,833 acres overlap with other Management Area Prescription allocations.

[6] 28,853 acres overlap with other Management Area Prescription allocations.

[7] 33,570 acres overlap with other Management Area Prescription allocations.

[8] 28,613 acres overlap with other Management Area Prescription allocations.

MITIGATION

The management prescriptions (Appendix F) include several that are specifically designed to provide areas where primitive and semi-primitive types of recreation may occur. Each prescription is designed to meet the objectives of one or more Recreation Opportunity Setting class. Standards and guidelines within the prescriptions, as well as the Forest-wide standards and guidelines (Appendix G) will be applied to ensure that appropriate recreation settings and opportunities are provided for a wide range of uses and activities. Standards and guidelines are also applied to developed sites (cabins, campgrounds), trails and other areas to provide opportunities for high-quality recreation experiences.

RESEARCH NATURAL AREAS

AFFECTED ENVIRONMENT

Research Natural Areas (RNA's) are part of a national network of field ecological areas designated for research and education and/or to maintain biological diversity on National Forest System lands. Research Natural Areas are used for for non-manipulative research, observation, and study. They also may serve to carry out provisions of special acts, such as the Endangered Species Act and the monitoring provisions of the National Forest Management Act.

Existing RNA's

Currently six Research Natural Areas are established on the Tongass National Forest. Figure 3-29 shows the location of these areas. The following narrative provides a brief description for each of them:

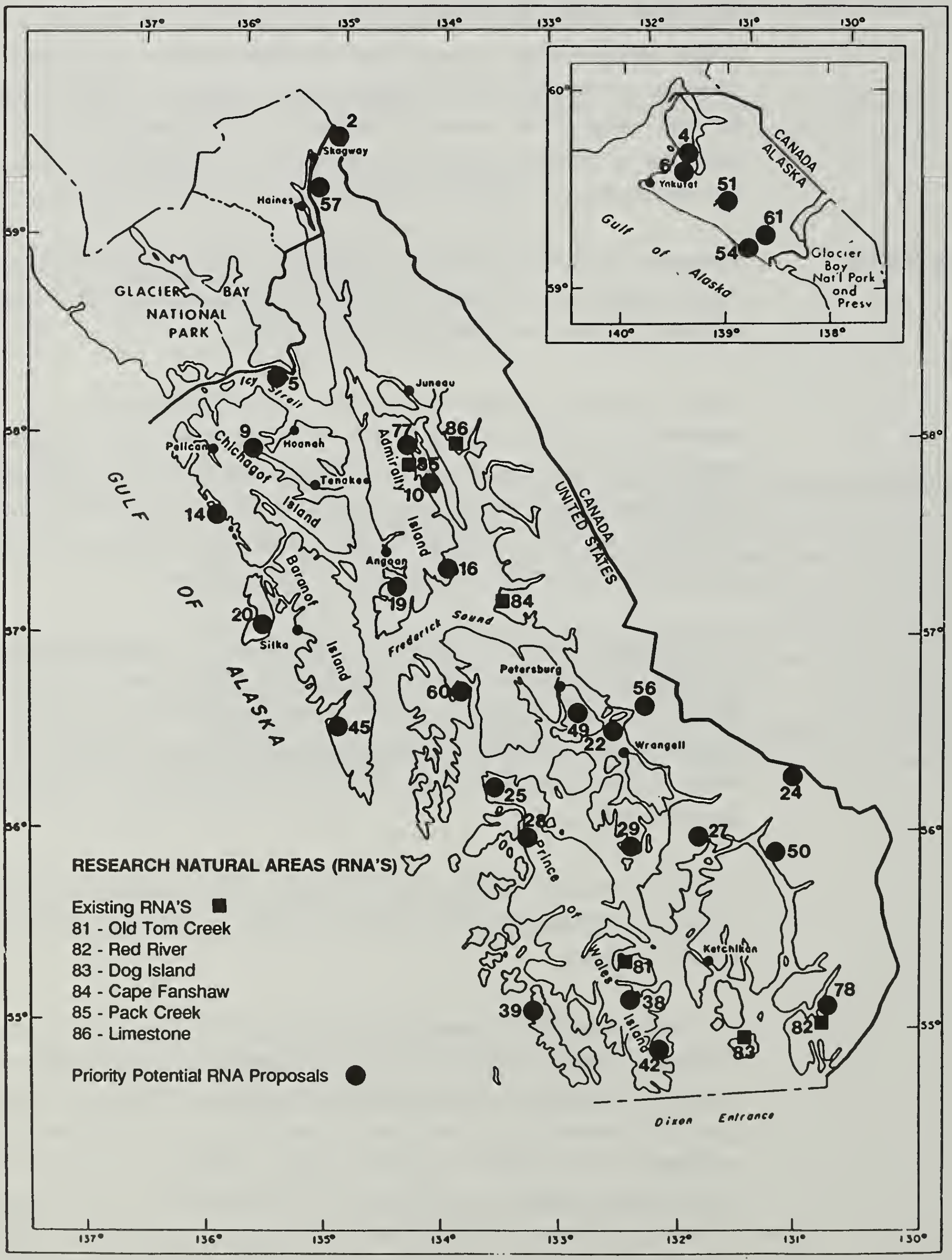
Pack Creek RNA. Established in 1951; size - 5,837 acres; located on Admiralty Island. This RNA was established to represent old-growth spruce/hemlock forest types in northern Southeast Alaska, and also to represent productive coastal brown bear habitat. The Pack Creek RNA also includes excellent examples of diverse alpine meadows, rockfalls, and snowfields representative of much of northern Admiralty Island.

Cape Fanshaw RNA. Established in 1965; size - 614 acres; located at the junction of Frederick Sound and Stephens Passage. This area was established to represent undisturbed old-growth Alaska yellow-cedar and western hemlock forests. It also represents a good example of cedar decline on the mainland, and has been used for long-term monitoring of changes in species composition and stand dynamics.

Red River RNA. Established in 1980; size - 8,031 acres; located in Misty Fiords Monument Wilderness. This RNA represents the northern range of silver fir (Abies amabilis).

Limestone Inlet RNA. Established in 1951; size - 6,399 acres; located in Stephens Passage. This area represents typical vegetation types common to the Juneau mainland, including many avalanche chutes and a mainland stream with a good fish population. In 1951, Limestone Inlet was considered the most pristine drainage in the northern mainland coast, making it an excellent area for documenting baseline conditions on the mainland. However, Alaska Department of Fish and Game has altered the native salmon runs since 1980 by operating a hatchery in nearby Snettisham Lake, although upland areas still remain intact.

FIGURE 3-29
LOCATION OF RESEARCH NATURAL AREAS



Red River RNA. Established in 1976; size - 705 acres; located on Dog Island. This RNA represents a small island ecosystem containing the northern limit of Pacific yew (Taxus brevifolia), associated scrub timber and low volume mixed conifer sites of southern Southeast Alaska.

Old Tom Creek RNA. Established in 1951; size - 4,544 acres; located on central Prince of Wales Island. Situated in a low-site, cedar-dominated watershed, this RNA was established as an example of cedar-hemlock old-growth forest. It also includes some examples of riparian spruce forest, extensive tidal meadows, and dense bald eagle and black bear populations.

Proposed RNA'S

The Alaska Regional Guide (USDA Forest Service, 1983) identified plant communities, shrub species, geologic landforms, and animals species which need to be included within a network of RNA's in Southeast Alaska. To date, not all the needed ecosystems identified in the Regional Guide have been included in RNA's on the Tongass National Forest. National Forest Management Act Regulations provide the following direction for RNA's: "Forest planning shall provide for the establishment of RNA's. Planning shall make provision for the identification of examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special and unique characteristics of scientific interest and importance...and that are needed to complete the National network of RNA's."

In response to this planning direction, a research natural areas workshop was organized as a cooperative effort between the Tongass Land Management Planning Team, the Forestry Sciences Lab, and the University of Alaska Ecological Reserves Program. The workshop had two primary objectives:

1. To identify the basic units (cells) which should be represented in a Research Natural Area system on the Tongass National Forest. Another way of stating this is: "What kinds of ecosystems and unique features should be represented within Research Natural Areas in Southeast Alaska?" The ecosystems and features identified in the Regional Guide were reviewed and refined by the workshop participants incorporating new information such as the recent plant association classification developed for the Tongass National Forest. Seven geographic provinces were described for the Tongass. Table 3-53 and Figure 3-30 describe and display these provinces.

2. Recommend potential areas on the Tongass National Forest which represent the cells (ecosystems) for Research Natural Area designation. The Tongass Forest Plan Revision is an opportunity to recommend new areas for Research Natural Area status because of the opportunity to evaluate the areas on a Forest-wide basis with other proposed management activities and programs, and to obtain public input on the proposals.

TABLE 3-53
GEOGRAPHIC PROVINCES

Geographic Province	*Description*
Yakutat Fore-lands	Includes Glacier Bay north to Yakutat Bay. Recently uplifted beaches and active fluvial processes related to icefields, valley glaciers, and cold wet climate distinguish this region from the rest of Southeast Alaska.
Northern Outer Islands	Rugged highly dissected topography exposed extremely wet outer coastal environment, and extensive alpine environments with productive forested areas highly fragmented and usually concentrated on oversteepened slopes and on valley bottoms.
Lynn Canal	The driest and one of the most continental environments in Southeast Alaska. Extreme rain shadow from the Chilkat and St. Elias Ranges allows extensive development of fire-dependent forests (lodgepole and birch), and the southern and westward extension of boreal forest and tundra plant species. Rugged scoured terrain with large vertical relief.
Coast Range	Rugged heavily glaciated terrain with extensive alpine and icefield environments. Productive forest land usually confined to river valleys and marine terraces. British Columbia batholith has major influence over the shole area. This province may be logically divided into two subzones, perhaps divided at the Bradfield Canal with more extensive alpine and active glaciation to the north and less extensive ice to the south.
Central Interior Islands	Includes Kupreanof Island lowlands and surrounding areas protected from storms off of the outer coast and generally moderate in precipitation and temperature extremes. Includes several major rain shadow areas such as northwest Kupreanof and parts of Etolin Island. Generally subdued rolling topography and extensive muskeg areas.
Northern Interior Islands	Includes eastern Chichagof and Admiralty Islands. Protected from full force of storms off the outer coast, but with colder climate and more rugged topography than in the central interior islands province. Also, with distinctive fauna. Originally considered to be a subprovince of the Northern Outer Islands, but because of its contrast in climate and geology with the outer coast and Baranof Island, it was redefined as its own province.
Southern Outer Islands	Rolling subdued topography to north and localized rugged topography to the south. Includes many refugia, unique plant and animal populations at the northern extent of their natural range, and highly productive forests, especially on limestone and marble soils derived from ancient coral reefs.

FIGURE 3-30
GEOGRAPHIC PROVINCES OF SOUTHEAST ALASKA

Workshop Objective 1

In accomplishing objective 1, workshop participants identified cell types (ecosystems and/or unique features) needing representation in RNA's in Southeast Alaska. The cell type needs included: vegetation cells, aquatic cells, and wildlife cells. Geology cells were incorporated with the vegetation and aquatic cells. A summary of the vegetation, wildife, and aquatic cell type needs identified at the workshop is presented in Tables 3-54 through 3-56. A more complete discussion of these cell type needs is presented in the report titled: "Research Natural Area Proposals for the Tongass Forest Plan Revision - Results of Research Natural Area Workshops, May 24 & 25 and July 21, 1988," by Juday et al, 1988. Additional information is also presented in the Analysis of the Management Situation, Tongass National Forest, 1990.

TABLE 3-54
VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

I. Yakutat Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Sitka spruce-cottonwood forests on recent uplifted beach soils and in association with active floodplains (alder, willow, and devil's club understories).
5. Glacial outwash meadows with sandy beach deposits.
6. Willow dominated brush fields.

Special types:

7. Disjunct populations of shore pine and associated muskeg features.
8. Post-glaciation successional types, including sea level valley glaciers as well as ice-dammed areas.

II. Northern Outer Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Exposed outer coast Sitka spruce-Pacific reedgrass beach forests.
7. Sitka spruce-sweet gale in protected coves.
8. Recent volcanic ash successional types.
9. Extensive ice retreat-glacial successional types.
10. Hot springs.

III. Northern Interior Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Hot springs.

TABLE 3-54 (continued)
VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

IV. Lynn Canal Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Sitka spruce-cottonwood floodplain and marine terrace forests (alder, willow, devil's club understories).

Special types:

7. Lodgepole pine forests of fire origin.
8. High elevation subalpine fir forests at northwest extent of natural range.
9. Sitka spruce-sweet gale in protected coves.
10. Isolated nunatak floras.
11. Southern and western extent of range of various alpine and forest plant species near Canadian border.

V. Coast Range Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).

Special types:

7. Recent lava flow successional types.
8. Pacific silver-fir at northern extent of range.
9. Swordfern, and salal at northern extent of range.
10. Large river gorges with more continental climate and isolated populations of boreal plant species.

VI. Central Interior Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).

TABLE 3-54 (continued)
VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

VI. Central Interior Islands Geographic Province (continued)

Special types:

4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).
7. Beach Sitka spruce-false lily of the valley forest.
8. Northern extent of range of western redcedar.
9. Northern extent of range of swordfern, salal.
10. Highly productive mature old-growth even-aged forests of fire origin in rainshadow areas (western hemlock series with blueberry understory).
11. Productive Sitka spruce-devil's club-enchanter's nightshade on active loess soils.
12. Hot springs.

VII. Southern Outer Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).
4. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Exposed outer coast Sitka spruce-Pacific reedgrass, meadow rue, beach forests.
7. Productive mature even-aged forests (blueberry-shield fern associations, 150-300 years old).
8. Productive old-growth forests on gentle topography, limestone-marble soils derived from ancient coral reefs.
9. Sitka spruce-sweet gale in protected coves.
10. Glacial refugia with disjunct populations of subalpine fir. (Glacial refugia are areas not glaciated during the last glacial period).
11. Glacial refugia and disjunct populations of alpine plant species with some at their northern extent of range.
12. Northern extent of range for Pacific yew and associated species.
13. Hemlock series forests and meadow vegetation on ultramafic bedrock types.

Source: Juday et al. 1988.

TABLE 3-55
EIGHT GENERAL WILDLIFE HABITATS RECOMMENDED AS CELL TYPE NEEDS FOR RNA's ON THE TONGASS NATIONAL FOREST

1. Old-growth riparian spruce habitat which would provide cell needs for riparian associated wildlife such as black bear, brown bear, river otter, bald eagle, common merganser, and pine marten.

2. A range of high to low volume old-growth upland hemlock/spruce habitats which would provide cell needs for deer, pine marten, blue grouse, wolf, cavity-nesting species, mountain goats (rocky, low elevation winter), and goose.

3. Alpine/subalpine habitats which would provide cell needs for deer (summer), mountain goats, blue grouse, wolf.

4. Wetland habitats which would provide cell needs for swans, geese, other waterfowl and shorebirds.

5. Beach fringe habitats which would provide cell needs for eagles, otter, black and brown bears, deer (winter), and marten (summer and winter).

6. Estuary habitats which would provide cell needs for black and brown bears, geese, common merganser, other waterfowl and shorebirds.

7. Deciduous shrub habitats which would provide cell needs for moose and wolf.

8. Isolated small islands which would represent small mammal island biogeography effects.

Source: Juday et al. 1988.

TABLE 3-56
GENERAL WATERSHED CELL TYPES RECOMMENDED FOR RNA's ON THE TONGASS NATIONAL FOREST.

Rock Basin Lake System Watersheds:
High scour
Scooped out of bedrock
Originally glacially formed
Bedrock control, numerous control (nick) points
Range from small to large systems
Process groups: contained mountainslope, moderate contained
Typically found in geographic provinces 2 (Northern Outer Islands) and 4 (Lynn Canal)

Alluvial "U" Shaped Valley Watershed with Steep Side Slopes
Spruce riparian communities in valley bottoms
Small (e.g. Limestone), medium (e.g. Gambier) and large (e.g. Kadashan) systems, although there can be considerable differences between them
Bedrock control on mountainslopes, alluvium on valley bottoms
Typically found in geographic provinces 2 (Northern Outer Islands) 4 (Lynn Canal) and 5 (Coast Range)

Glacial (active) -- Mainland Valley Watersheds
Typically found in geographic provinces 1 (Yakutat), 3 (Northern Interior Islands) and 4 (Lynn Canal)

Glacial (active) -- Outwash Plain Watersheds
Typically found in geographic province 1 (Yakutat)

Alluvial - Low Overall Gradient, Rolling Topography Watersheds
Mixed controls (stream channel controls)
Various bedrock
Mixed vegetation
Low gradient alluviums
Some watersheds with lakes, lakes, although some without
Typically found in geographic provinces 5 (Coast Range), and 6 (Central Interior Islands) and small parts of 2 (Northern Outer Islands)

Steep Streams Terminating in Salt Water
Various substrates (sizes of rock in the stream or river bed (bottom)
Typically bedrock control, although sometimes large rock
Typically found in all geographic provinces

Raised Marine Terraces with Marine Clays
Parts of Kupreanof Island, west side of Duncan Canal (could be a small watershed), maybe a tributary to Iyoutuk, maybe somewhere on North Chichagof

---

Source: Juday et al. 1988.

Workshop Objective 2

To accomplish objective number 2, workshop participants identified over 60 potential candidate areas on the Tongass National Forest which could represent the vegetation, wildlife, and aquatic cell type needs. An RNA steering committee evaluated these 60 proposed areas using the following steps:

1. Each of the areas was evaluated using criteria developed at the RNA workshops and the direction for RNA's in the Regional Guide.
2. Field trips were made to many of the potential candidate RNA's to gain on-the-ground knowledge. Information from these field trips, additional study of available scientific and resource information, and written comments from scientists and resource specialists unable to attend the workshops, resulted in some new potential candidate RNA's and changes in ranking.
3. Glenn Juday studied herbarium and other collection information to define uncommon plants for Southeast Alaska, and used this information as an additional criterion to evaluate potential candidate RNA's.
4. The Tongass Administrative Areas and Ranger Districts subsequently reviewed all of the potential candidate RNA proposals and provided the RNA Steering Committee with additional resource information for minerals, timber, State and Native land selections, fish enhancement projects, developed and undeveloped recreation uses, existing and proposed transportation needs, and other pertinent information affecting the suitability of each area for consideration as an RNA. Several additional potential candidate RNA proposals were recommended by the Ketchikan Area to help fill some of the cell type needs.

As a result of the evaluations, 30 new potential candidate RNA's are proposed for consideration in the Tongass Forest Plan Revision. This is roughly 10 per administrative area. These 30 new potential candidate RNA's are termed "priority potential RNA's" and are listed in Table 3-57. Two to six priority potential RNA's are proposed in each geographic province so that the typical features of each region are adequately represented (Figure 3-30). In many cases, valuable, well-documented proposals were not recommended as priority potential RNA's due to redundancy in features with existing or proposed RNA's, or unreasonable resource conflicts.

Tables 3-58, 3-59 and 3-60 display how the existing RNA's and the proposed potential RNA's fill the vegetation cell type needs, wildlife cell type needs, and aquatic cell type needs, respectively. Appendix D contains additional information and descriptions for the proposed potential RNA's.

TABLE 3-57
PRIORITY POTENTIAL RESEARCH NATURAL AREA PROPOSALS

Map Number	
	YAKUTAT FORELANDS GEOGRAPHIC PROVINCE
54	Akwe Beach (11,032 acres)
61	Akwe-Ustay Lakes (9,786 acres)
4	Mountain Lake (5,425 acres)
51	Pike Lakes (1,822 acres)
6	Upper Situk (2,723 acres)
	LYNN CANAL GEOGRAPHIC PROVINCE
2	Warm Pass (10,560 acres)
57	Dayebas Creek (8,724 acres)
	COAST RANGE GEOGRAPHIC PROVINCE
24	Blue Lake Lava (19,323 acres)
78	Martin River (6,213 acres)
50	Robinson Lake (4,297 acres)
56	Twin Lakes (7,202 acres)
	NORTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE
20	Crater Ridge-Freds Creek (8,630 acres)
14	Myriad Islands (302 acres)
45	Plotnikof-Port Banks (16,723 acres)
	NORTHERN INTERIOR ISLANDS GEOGRAPHIC PROVINCE
19	Chaik Bay (8,314 acres)
16	Gambier Bay (4,777 acres)
10	Tiedeman Island (4,750 acres)
5	Pleasant Island (5,256 acres)
9	Upper Tenakee Inlet Hot Springs (15,651 acres)
77	Swan Cove (24,408 acres)
	CENTRAL INTERIOR ISLANDS GEOGRAPHIC PROVINCE
27	Bailey Bay Hot Springs (2,404 acres)
49	Falls Creek Windthrow (821 acres)
22	Kadin Island (1,523 acres)
60	Port Camden Fossil (7,920 acres)
29	South Etolin Island (5,346 acres)
	SOUTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE
38	Disappearance Creek (741 acres)
42	Johnson Lake (2,641 acres)
25	Mount Calder-Virginia Mountain (5,131 acres)
28	Sarkar Lakes (8,682 acres)
39	Thunder Mountain (5,189 acres)

Source: RNA Workshop, May 24 & 25, and July 21, 1988; AMS 1990.

TABLE 3-58
SUMMARY OF HOW THE EXISTING RNA's AND THE PRIORITY POTENTIAL RNA FILL THE VEGETATION CELL TYPE.[1]

Existing RNA's and Potential Proposals	*Vegetation Cell Types*[2]												
YAKUTAT PROVINCE	1	2	3	4	5	6	7	8					
Akwe Beach	-	-	-	-	X	x	-	-					
Akwe-Ustay Lakes	-	-	-	x	-	x	-	x					
Mountain Lake	x	x	x	-	-	-	-	-					
Pike Lakes	-	x	-	-	-	-	X	-					
Upper Situk	x	-	-	-	x	X	-	-					
LYNN CANAL PROVINCE	1	2	3	4	5	6	7	8	9	10	11		
Warm Pass	-	-	x	-	-	-	x	x	-	x	x		
Dayebas Creek	-	x	x	-	-	X	x	-	-	-	x		
COAST RANGE PROVINCE	1	2	3	4	5	6	7	8	9	10			
(Limestone Inlet)	-	x	x	x	x	-	-	-	-	-			
(Cape Fanshaw)	-	x	-	X	-	-	-	-	-	-			
(Red River)	-	x	x	x	-	x	-	X	-	-			
Blue Lake Lava	-	x	x	-	x	x	X	-	-	-			
Martin River	-	-	-	-	-	-	-	-	-	-			
Robinson Lake	x	x	x	-	x	x	-	-	-	-			
Twin Lakes	-	x	x	-	x	-	-	-	x	X			
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10			
Crater Ridge-Fred Creek	x	x	x	x	x	-	-	x	-	-			
Myriad Islands	-	-	-	-	-	X	?	-	-	-			
Plotnikof-Pt. Baker	x	x	x	x	x	x	?	-	-	-			
N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6							
(Pack Creek)	x	x	x	x	x	-							
Chaik Bay	X	x	x	x	x	-							
Gambier Bay	x	X	x	x	x	-							
Tiedeman Island	x	x	-	-	-	-							
Pleasant Island	x	x	-	x	x	-							
Upper Tenakee Hot Sp	-	x	x	x	-	X							
Swan Cove	x	x	x	x	-	-							
C. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	13
Bailey Bay	x	x	-	-	x	x	x	-	-	-	-	-	X
Falls Creek Windthrow	-	x	-	x	-	-	-	-	-	-	X	-	-
Kadin Island	-	x	-	-	-	-	-	-	-	-	-	X	-
Port Camden Fossil	x	x	-	-	-	-	x	-	-	-	-	-	-
South Etolin Island	x	x	x	-	x	X	x	x	-	x	-	-	-
S. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	13
(Dog Island)	-	x	x	-	x	-	-	-	-		-	X	-
(Old Tom Creek)	x	x	x	x	x	-	-	-	-	-	-	-	-
Disappearance Creek	x	x	x	x	?	-	-	x	-	-	-	-	-
Johnson Lake	X	x	x	x	x	-	-	-	-	-	-	-	-
Mount Calder-Virginia Mountain	-	x	x	x	x	-	-	-	-	X	x	x	-
Sarkar Lakes	-	x	x	-	x	-	-	-	-	-	-	-	-
Thunder Mountain	x	x	x	x	x	x	-	-	?	?	X	-	-

Source: Juday et al, 1988 and RNA Steering Committee.
[1]An "x" indicates that an area has at least a minimal representation of the cell type. An "X" indicates that an area has an exceptional example of the cell type. A "?" indicates possible representation of the cell type. Parenthesis ( ) around the RNA name represent already established RNA's.
[2]Vegetation cell type numbers refer to the numbers for each cell type presented in Table 3-100.

TABLE 3-59
SUMMARY OF HOW THE EXISTING RNA'S AND THE PRIORITY POTENTIAL RNA PROPOSALS FILL THE WILDLIFE CELL TYPES.

	Wildlife Cell Types[1]								
		Hemlock & Spruce							
Existing RNA's and Potential Proposals	*Ripari-an Spruce*	*High Vol-ume*	*Low Vol-ume*	*Alpine Sub-alp*	*Wet-land*	*Beach*	*Estu-ary*	*Decid Shrub*	*Small Island*
YAKUTAT PROVINCE	1	2	3	4	5	6	7	8	9
Akwe Beach	X	-	-	-	X	X	-	X	-
Akwe-Ustay Lks	X	-	-	-	X	-	-	X	-
Mountain Lake	-	-	X	X	X	-	-	-	-
Pike Lakes	-	-	X	-	X	-	-	-	-
Upper Situk Rv	-	-	-	-	-	-	-	X	-
LYNN CANAL PROVINCE	1	2	3	4	5	6	7	8	9
Warm Pass	-	-	X	X	-	-	-	-	-
Dayebas Creek	-	-	X	X	-	-	-	X	-
COAST RANGE PROVINCE	1	2	3	4	5	6	7	8	9
Limestonelslet (existing RNA)	-	X	X	X	-	X	X[3]	-	-
Cape Fanshaw (existing RNA)	-	-	X	-	-	-	-	-	-
Red River (existing RNA)	-	X	X	X	-	X	X[3]	-	-
Blue Lake Lava	-	X	X	X	-	-	-	X	-
Martin River	X	-	X	X	-	-	-	X	-
Robinson Lake	X	-	X	X	X	-	-	-	-
Twin Lakes	-	-	X	X	X	-	-	X	-
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Crater Ridge-Fred's Cr.	-	X	X	-	-	-	X	-	-
Myriad Islands	-	-	-	-	-	-	X[2]	-	X
Plotnikof-Port Banks	X	-	-	X	X	X	-	-	-
N. INTERIOR ISANDS PROVINCE	1	2	3	4	5	6	7	8	9
Pack Creek (existing RNA)	X	X	X	X	-	X	X[3]	-	-
Chaik Bay	X	X	X	X	X	X	X[3]	-	-
Gambier Bay	-	X	X	-	X	X	X[3]	-	-
Tiedeman Is.	-	X	X	-	X	X	-	-	X
Pleasant Is.	-	-	X	-	X	X	-	-	X
Upper Tenakee Hot Springs	-	-	X	-	-	X	X[1]	-	-
Swan Cove	X	X	X	X	-	X	X[3]	-	-

TABLE 3-59 (continued)
SUMMARY OF HOW THE EXISTING RNA'S AND THE PRIORITY POTENTIAL RNA PROPOSALS FILL THE WILDLIFE CELL TYPES.

					Wildlife Cell Types[1]				
		Hemlock & Spruce							
Existing RNA's and Potential Proposals	*Riparian Spruce*	*High Volume*	*Low Volume*	*Alpine Subalp*	*Wetland*	*Beach*	*Estuary*	*Decid Shrub*	*Small Island*
C. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Bailey Bay	-	X	X	X	-	-	-	-	-
Falls Creek Windthrow	-	X	-	-	-	-	-	-	-
Kadin Island	-	-	-	-	-	X	-	-	X
Port Camden Fossil	-	-	-	-	-	X	-	-	-
South Etolin Island	-	X	-	-	-	X	-	-	-
S. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Dog Island (existing)	-	-	X	-	-	X	-	-	X
Old Tom Creek (existing)	-	-	X	-	X	X	X	-	-
Disappearance Creek	X	X	X	-	X	X	X	-	-
Johnson Lake	X	X	X	X	X	-	-	-	-
Mt. [illegible]-[illegible] Mt.	-	-	X	X	-	-	-	-	-
Sarkar Lakes	X	X	X	-	X	-	-	-	-
Thunder Mnt.	X	X	X	X	X	X	X[1]	-	-

Source: Juday at et al, 1988 and RNA Steering Committee

[1]Wildlife Cell Types: 1 = Riparian Spruce Habitat; 2 = High to Moderate Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 3 = Low Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 4 = Alpine and Subalpine Habitats; 5 = Wetland Habitats; 6 = Beach Fringe Habitats; 7 = Estuary Habitats (three general types of estuary habitats were recognized: elymus types, sedge types, meadow types; and X[1] indicates one type present, X[2] indicates two types present, X[3] indicates 3 types present, X types present, X indicates types unkown); 8 = Deciduous Shrub Habitats; 9 = Small Islands.

TABLE 3-60
SUMMARY OF HOW THE EXISTING RNA's AND THE PRIORITY POTENTIAL RNA PROPOSALS FILL THE AQUATIC CELL TYPES.

Existing RNA's and Potential Proposals	*General Watershed Cell Types*[1]						
YAKUTAT PROVINCE	1	2	3	4	5	6	7
Akwe Beach	X	-	-	-	-	-	X
Akwe-Ustay Lakes [2]	-	X	-	-	-	-	-
Mountain Lake	-	-	-	X	-	-	-
Pike Lakes	X	-	-	-	-	-	-
Upper Situk River	X	-	-	-	-	-	-
LYNN CANAL PROVINCE 1	2	3	4	5	6	7	
Warm Pass	-	-	X	-	-	-	-
Dayebas Creek	-	-	-	-	X	-	-
COAST RANGE PROVINCE	1	2	3	4	5	6	7
Limestone Inlet (existing RNA)	-	-	X	-	-	-	-
Cape Fanshaw (existing RNA)	-	-	-	X	X	-	-
Red River (existing RNA)	-	-	X	-	-	-	-
Blue Lake Lava	-	X	-	-	-	-	-
Martin River	-	-	X	-	-	-	-
Robinson Lake	-	-	-	-	-	-	-
Twin Lakes	-	X	-	-	-	-	-
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7
Crater Ridge-Fred's Creek	-	-	-	-	-	-	-
Myriad Islands	-	-	-	-	-	-	-
Plotnikof-Port Banks	-	-	-	X	-	-	-
N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7
Pack Creek (existing RNA)	-	-	X	-	-	-	-
Chaik Bay	-	-	X	-	-	-	-
Gambier Bay	-	-	X	-	-	-	-
Tiedeman Island	-	-	-	-	X	-	-
Pleasant Island	-	-	-	-	X	-	-
Upper Tenakee Hot Spr.	-	-	X	-	-	-	-
Swan Cove	-	-	X	-	-	-	-

TABLE 3-60 (Continued)
SUMMARY OF HOW THE EXISTING RNA's AND THE PRIORITY POTENTIAL RNA PROPOSALS FILL THE AQUATIC CELL TYPES.

Existing RNA's and Potential Proposals	*General Watershed Cell Types*[1]						
C. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7
Bailey Bay	-	-	X	-	-	-	-
Falls Creek Windthrow	-	-	X	-	-	-	-
Kadin Island	-	-	-	-	X	-	-
Port Camden Fossil	-	-	-	-	-	X	-
South Etolin Island	-	-	-	-	-	X	-
S. OUTER ISLANDS PROVINCE							
Dog Island (existing)	-	-	-	-	-	-	-
Old Tom Creek (existing)	-	-	-	-	-	-	X
Disappearance Creek	-	-	-	X	-	-	-
Johnson Lake	-	-	X	-	-	-	-
Mt.Calder-Virginia Mtn	-	-	-	-	X	-	-
Sarkar Lakes	-	-	-	-	-	X	-
Thunder Mountain	-	-	-	-	-	-	-

Source: Juday et al, 1988 and RNA Steering Committee

[1] General Aquatic Cell Types: 1 = Active Glacial Outwash Plain/Watershed; 2 = Active Glacial Mainland Valley; 3 = Alluvial "U"-Shaped Valley with Steep Side Slopes; 4 = Rock Basin Lake Systems; 5 = Steep Streams (Mountain Slope) Terminating in Salt Water; 6 = Alluvial, Low Gradient, Rolling Topography (Rolling Ground Moraine); 7 = Raised Marine Terrace with Marine Clays

[2] Akwe Lake is a clear water, former pro-glacial lake; Ustay Lake is a pro-glacial lake.

RESEARCH NATURAL AREAS

ENVIRONMENTAL CONSEQUENCES

DIRECT AND INDIRECT EFFECTS

This section focuses on the effect that each alternative will have on the present or future establishment of a representative system of Research Natural Areas for the Tongass. The effects of Research Natural Area (RNA) designations on other resources are covered under the sections for those resources. Designation of an area as an RNA will make it unavailable for certain resource uses, in particular those that involve land-altering activities such as timber harvest or road construction. Conversely, an RNA designation will preserve the natural qualities of an area, such as visual quality and existing wildlife habitat. For the purposes of analyzing effects to other resources, the Research Natural Area prescription is a part of the Natural Setting prescription group.

Table 3-61 indicates which of the priority potential Research Natural Areas are recommended for establishment in each alternative, and what management they would receive if not established. Alternative A recommends establishment of all 30 of the priority potential RNA proposals, Alternative B 27, Alternatives C, F and G 20, Alternative E 19, and Alternative D 14.

A total of 70 vegetation cell types were identified as needing representation in RNA's within the 7 geographic provinces; 9 of these cell types are not represented by the 30 priority potential RNA proposals and thus are not represented in any of the alternatives.

A total of 63 wildlife cell types were identified as needing representation in RNA's within the 7 geographic provinces; 17 of these cell types are not represented by the 30 priority potential RNA proposals and thus are not represented in any of the alternatives.

A total of 49 watershed cell types were identified as needing representation in RNA's within the 7 geographic provinces; 28 of these cell types are not represented by the 30 priority potential RNA proposals and thus are not represented in any of the alternatives.

TABLE 3-61
SUMMARY OF HOW THE PRIORITY POTENTIAL RNA PROPOSALS ARE ALLOCATED IN EACH ALTERNATIVE[1]

	Alternative						
	A	B	C	D	E	F	G
YAKUTAT PROVINCE							
Akwe Beach	R	N	M	N/I	W	N	N
Akwe-Ustay Lakes	R	R*N	R*M	R*I	R*W	R*N	R*N
Mountain Lake	R	R	R	R	R	R	R
Pike Lakes	R	R	R	M/I	R	R	R
Upper Situk	R	R	R	W/N	R	R	R
LYNN CANAL							
Warm Pass	R	R	R	R*N	R	R	R
Dayebas Creek	R	R	R	R	R	R	R
COAST RANGE PROVINCE							
Blue Lake Lava	R	R	R	R	R	R	R
Martin River	R	R	R	R	R	R	R
Robinson Lake	R	R	R	R	R	R	R
Twin Lakes	R	R	R	R	R	R	R
N. OUTER ISLANDS PROVINCE							
Crater Ridge-Fred Creek	R	R	M	M	M	M	M
Myriad Islands	R	R	R	R	R	R	R
Plotnikof-Pt Banks	R	R	R	R	R	R	R
N. INTERIOR ISLANDS PROVINCE							
Chaik Bay	R	R	R	R	R	R	R
Gambier Bay	R	R	R	R	R	R	R
Tiedeman Island	R	R	R	R	R	R	R
Pleasant Island	R	R	R	N	W	R	R
Upper Tenakee Hot Springs	R	R	M	I	W	M	M
Swan Cove	R	R	R	R	R	R	R
C. INTERIOR ISLANDS PROVINCE							
Bailey Bay	R	R	R	N	R	R	R
Falls Creek Windthrow	R	R	M/I	M	M/I	M/I	M/I
Kadin Island	R	N	N/M	N	N/M	N/M	N/M
Port Camden Fossil	R	R*N	N/I	N/I	W/I	N/I	N/I
South Etolin Island	R	R	R	I	R	R	R
S. OUTER ISLANDS PROVINCE							
Disappearance Creek	R	R*N	I	I	I	I	I
Johnson Lake	R	N	M	I	M	M	M
Mount Calder-Virginia Mt	R	R	I	I	I	I	I
Sarkar Lakes	R	R	R	I	R	R	R
Thunder Mountain	R	R	I	I	I	I	I

[1] Letter symbols represent the following: R= recommended for Research Natural Area designation; R*= recommended for Research Natural Area designation, but original proposal has been reduced in size; W= wilderness or recommended wilderness prescription group; N= natural setting prescription group; M= moderate development presciption group; I= intensive development prescription group.

EFFECTS OF ALTERNATIVES

Alternative A. Alternative A would provide representation of 59 vegetation cell types in the 7 geographic provinces (Table 3-62), 46 wildlife cell types (Table 3-63), and 21 general watershed cell types (Table 3-64). Two additional vegetation cell types may be represented in Alternative A, but more analysis or field work will be needed to verify this.

Alternative B. Alternative B would provide representation of 55 vegetation cell types in the 7 geographic provinces, 43 wildlife cell types, and 16 general watershed cell types. Five additional vegetation cell types, one additional wildlife cell type, and two additional watershed cell types may be represented in alternative B, but more analysis or field work will be needed to verify this.

Alternatives C, E, F and G. Alternatives C, E, F, and G each provide representation of 49 vegetation cell types in the 7 geographic provinces, 40 wildlife cell types, and 15 general watershed cell types. Three additional vegetation cell types, one additional wildlife cell type, and one additional watershed cell type may be represented in Alternatives C, E, F, and G, but more analysis or field work will be needed to verify this.

Alternative D. Alternative D would provide representation of 35 vegetation cell types in the 7 geographic provinces, 33 wildlife cell types, and 11 general watershed cell types. Six additional vegetation cell types, two additional wildlife cell type, and one additional watershed cell types may be represented in alternative D, but more analysis or field work will be needed to verify this.

TABLE 3-62
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE VEGETATION CELL TYPES IN EACH GEOGRAPHIC PROVINCE[1]

Vegetation Cell Type [2]

YAKUTAT PROVINCE	1	2	3	4	5	6	7	8
Alternative A	x	x	x	x	X	X	X	x
Alternative B	x	x	x	?	x	X	X	?
Alternative C	x	x	x	?	x	X	X	?
Alternative D	x	x	x	?	-	?	-	?
Alternative E	x	x	x	?	x	X	X	?
Alternative F	x	x	x	?	x	X	X	?
Alternative G	x	x	x	?	x	X	X	?

LYNN CANAL PROVINCE	1	2	3	4	5	6	7	8	9	10	11
Alternative A	-	x	x	-	-	X	x	x	-	x	x
Alternative B	-	x	x	-	-	X	x	x	-	x	x
Alternative C	-	x	x	-	-	X	x	x	-	x	x
Alternative D	-	x	x	-	-	X	x	?	-	?	x
Alternative E	-	x	x	-	-	X	x	x	-	x	x
Alternative G	-	x	x	-	-	X	x	x	-	x	x

COAST RANGE PROVINCE	1	2	3	4	5	6	7	8	9	10
hereh Alternative A	x	x	x	X	x	x	X	X	x	X
Alternative B	x	x	x	X	x	x	X	X	x	X
Alternative C	x	x	x	X	x	x	X	X	x	X
Alternative D	x	x	x	X	x	x	X	X	x	X
Alternative E	x	x	x	X	x	x	X	X	x	X
Alternative F	x	x	x	X	x	x	X	X	x	X
Alternative G	x	x	x	X	x	x	X	X	x	X

N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10
Alternative A	x	x	x	x	x	X	?	x	-	-
Alternative B	x	x	x	x	x	X	?	x	-	-
Alternative C	x	x	x	x	x	X	?	-	-	-
Alternative D	x	x	x	x	x	X	?	-	-	-
Alternative E	x	x	x	x	x	X	?	-	-	-
Alternative F	x	x	x	x	x	X	?	-	-	-
Alternative G	x	x	x	x	X	X	?	-	-	-

N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6
Alternative A	X	X	x	x	x	X
Alternative B	X	X	x	x	x	X
Alternative C	X	X	x	x	x	-
Alternative D	X	X	x	x	x	-
Alternative E	X	X	x	x	x	-
Alternative F	X	X	x	x	x	-
Alternative G	X	X	x	x	x	-

TABLE 3-62 (continued)
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE VEGETATION CELL TYPES IN EACH GEOGRAPHIC PROVINCE[1]

	Vegetation Cell Type[2]												
C. INTERIOR ISLAND PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	
Alternative A	x	x	x	x	x	X	x	x	-	X	X	X	
Alternative B	x	x	x	x	x	X	x	x	-	X	-	X	
Alternative C	x	x	x	-	x	X	x	x	-	x	-	X	
Alternative D	-	-	-	-	-	-	-	-	-	-	-	-	
Alternative E	x	x	x	-	x	X	x	x	-	x	-	X	
Alternative F	x	x	x	-	x	X	x	x	-	x	-	X	
Alternative G	x	x	x	-	x	X	x	x	-	x	-	X	
S. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	13
Alternative A	X	x	x	x	x	x	-	x	?	X	X	X	-
Alternative B	x	x	x	x	x	x	-	?	?	X	X	X	-
Alternative C	x	x	x	x	x	-	-	-	-	-	-	X	-
Alternative D	x	x	x	x	x	-	-	-	-	-	-	X	-
Alternative E	x	x	x	x	x	-	-	-	-	-	-	X	-
Alternative F	x	x	x	x	x	-	-	-	-	-	-	X	-
Alternative G	x	x	x	x	x	-	-	-	-	-	-	X	-

[1]An "x" indicates at least a minimal representation of the cell type. An "X" indicates an exceptional example of the cell type. A "?" indicates possible representation of the cell type.
[2] Vegetation cell type numbers refer to the numbers for each cell type presented in Table 3-xxx.

TABLE 3-63
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE WILDLIFE CELL TYPES IN EACH GEOGRAPHIC PROVINCE.

	Wildlife Cell Types[1]								
YAKUTAT PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	x	-	x	x	x	x	-	x	-
Alternative B	?	-	x	x	x	-	-	x	-
Alternative C	?	-	x	x	x	-	-	x	-
Alternative D	?	-	x	x	x	-		?	-
Alternative E	?	-	x	x	x	-	-	x	-
Alternative F	?	-	x	x	x	-	-	x	-
Alternative G	?	-	x	x	x	-	-	x	-
LYNN CANAL PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	-	-	x	x	-	-	-	x	-
Alternative B	-	-	x	x	-	-	-	x	-
Alternative C	-	-	x	x	-	-	-	x	-
Alternative D	-	-	x	x	-	-	-	x	-
Alternative E	-	-	x	x	-	-		x	-
Alternative F	-	-	x	x	-	-	-	x	-
Alternative G	-	-	x	x	-	-		x	-
COAST RANGE PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	x	x	x	x	x	x	x	x	-
Alternative B	x	x	x	x	x	x	x	x	-
Alternative C	x	x	x	x	x	x	x	x	-
Alternative D	x	x	x	x	x	x	x	x	-
Alternative E	x	x	x	x	x	x	x	x	-
Alternative F	x	x	x	x	x	x	x	x	-
Alternative G	x	x	x	x	x	x	x	x	-
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	x	x	x	x	x	x	x	-	x
Alternative B	x	x	x	x	x	x	x	-	x
Alternative C	x	-	-	x	x	x	x	-	x
Alternative D	x	-	-	x	x	x	x	-	x
Alternative E	x	-	-	x	x	x	x	-	x
Alternative F	x	-	-	x	x	x	x	-	x
Alternative G	x	-	-	x	x	x	x	-	x
N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	x	x	x	x	x	x	x	-	x
Alternative B	x	x	x	x	x	x	x	-	x
Alternative C	x	x	x	x	x	x	x	-	x
Alternative D	x	x	x	x	x	x	x	-	x
Alternative E	x	x	x	x	x	x	x	-	x
Alternative F	x	x	x	x	x	x	x	-	x
Alternative G	x	x	x	x	x	x	x	-	x

TABLE 3-63 (continued)
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE WILDLIFE CELL TYPES IN EACH GEOGRAPHIC PROVINCE.

	Wildlife Cell Types[1]								
C. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	-	x	x	x	-	x	-	-	x
Alternative B	-	x	x	x	-	x	-	-	-
Alternative C	-	x	x	x	-	x	-	-	-
Alternative D	-	-	-	-	-	-	-	-	-
Alternative E	-	x	x	x	-	x	-	-	-
Alternative F	-	x	x	x	-	x	-	-	-
Alternative G	-	x	x	x	-	x	-	-	-
S. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9
Alternative A	x	x	x	x	x	x	x	-	x
Alternative B	x	x	x	x	x	x	x	-	x
Alternative C	x	x	x	-	x	x	x	-	x
Alternative D	-	-	x	-	x	x	x	-	x
Alternative E	x	x	x	-	x	x	x	-	x
Alternative F	x	x	x	-	x	x	x	-	x
Alternative G	x	x	x	-	x	x	x	-	x

[1]Wildlife Cell Types: 1 = Riparian Spruce Habitat; 2 = High to Moderate Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 3 = Low Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 4 = Alpine and Subalpine Habitats; 5 = Wetland Habitats; 6 = Beach Fringe Habitats; 7 = Estuary Habitats; 8 = Deciduous Shrub Habitats; 9 = Small Islands. An "x" indicates at least a minimal representation of the cell type. A "?" indicates possible representation of the cell type.

TABLE 3-64
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE GENERAL WATERSHED CELL TYPES IN EACH GEOGRAPHIC PROVINCE.

	General Watershed Cell Types[1]						
YAKUTAT PROVINCE	1	2	3	4	5	6	7
Alternative A	x	x	-	x	-	-	x
Alternative B	x	?	-	x	-	-	-
Alternative C	x	?	-	x	-	-	-
Alternative D	-	?	-	x	-	-	-
Alternative E	x	?	-	x	-	-	-
Alternative F	x	?	-	x	-	-	-
Alternative G	x	?	-	x	-	-	-
LYNN CANAL PROVINCE	1	2	3	4	5	6	7
Alternative A	-	-	x	-	x	-	-
Alternative B	-	-	x	-	x	-	-
Alternative C	-	-	x	-	x	-	-
Alternative D	-	-	x	-	x	-	-
Alternative E	-	-	x	-	x	-	-
Alternative F	-	-	x	-	x	-	-
Alternative G	-	-	x	-	x	-	-
COAST RANGE PROVINCE	1	2	3	4	5	6	7
Alternative A	-	x	x	x	x	-	-
Alternative B	-	x	x	x	x	-	-
Alternative C	-	x	x	x	x	-	-
Alternative D	-	x	x	x	x	-	-
Alternative E	-	x	x	x	x	-	-
Alternative F	-	x	x	x	x	-	-
Alternative G	-	x	x	x	x	-	-
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7
Alternative A	-	-	-	x	-	-	-
Alternative B	-	-	-	x	-	-	-
Alternative C	-	-	-	x	-	-	-
Alternative D	-	-	-	x	-	-	-
Alternative E	-	-	-	x	-	-	-
Alternative F	-	-	-	x	-	-	-
Alternative G	-	-	-	x	-	-	-
N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7
Alternative A	-	-	x	-	x	-	-
Alternative B	-	-	x	-	x	-	-
Alternative C	-	-	x	-	x	-	-
Alternative D	-	-	x	-	x	-	-
Alternative E	-	-	x	-	x	-	-
Alternative F	-	-	x	-	x	-	-
Alternative G	-	-	x	-	x	-	-

TABLE 3-64 (continued)
COMPARISON OF HOW EACH ALTERNATIVE PROVIDES FOR REPRESENTATION OF THE GENERAL WATERSHED CELL TYPES IN EACH GEOGRAPHIC PROVINCE.

	General Watershed Cell Types[1]						
C. INTERIOR ISLANDS PROVINCE	1	2	4	4	5	6	7
Alternative A	-	-	x	-	x	x	-
Alternative B	-	-	x	-	-	x	-
Alternative C	-	-	x	-	-	x	-
Alternative D	-	-	-	-	-	-	-
Alternative E	-	-	x	-	-	x	-
Alternative F	-	-	x	-	-	x	-
Alternative G	-	-	x	-	-	x	-
S. OUTER ISLANDS PROVINCE	1	2	4	4	5	6	7
Alternative A	-	-	x	x	x	x	x
Alternative B	-	-	-	?	x	x	x
Alternative C	-	-	-	-	-	x	x
Alternative D	-	-	-	-	-	-	x
Alternative E	-	-	-	-	-	x	x
Alternative F	-	-	-	-	-	x	x
Alternative G	-	-	-	-	-	x	x

[1]General Aquatic Cell Types: 1 = Active Glacial Outwash Plain/Watershed; 2 = Active Glacial Mainland Valley; 3 = Alluvial "U"-Shaped Valley with Steep Side Slopes; 4 = Rock Basin Lake Systems; 5 = Steep Streams (Mountain Slope) Terminating in Salt Water; 6 = Alluvial, Low Gradient, Rolling Topography (Rolling Ground Moraine); 7 = Raised Marine Terrace with Marine Clays. An "x" indicates at least a minimal representation of the cell type.

CUMULATIVE EFFECTS

Over time, potential Research Natural Areas that are not designated may lose the natural qualities which qualified them for Research Natural Area consideration. This will occur primarily where land-altering activities take place. As potential but undesignated areas are changed in this way, the opportunities for research on the various ecological systems and their cell types will diminish.

Alternative D, with only 14 of the 30 priority RNAs designated, has the greatest potential for the cumulative loss of research opportunities. Alternatives C, E, F and G, each with 19 to 20 areas designated, have a moderate potential for such losses. Alternatives B (with 27) and A (with all 30) have little or no potential for cumulative effects.

Table 3-61 shows how the management prescriptions, represented by the four prescription groupings, are applied to the land areas of the 30 priority potential RNAs by alternative. This is another way of evaluating cumulative effects. Once again, Alternative D, with 11 of the priority potential RNA proposals allocated to intensive development prescriptions, and 3 allocated to moderate development prescriptions, has the greatest potential for affecting RNA values. Alternatives C, E, F, and G are similar in their effects on RNA values, with 5 of the priority potential RNA proposals allocated to intensive development prescriptions, and 7 (Alt. C) or 5 (Alts. F and G) or 4 (Alt. E) allocated to moderate development prescriptions. In Alternative B, the priority potential RNA proposals which are not recommended for RNA designation are allocated to the natural setting prescription group, which will help maintain their original RNA values.

ROADLESS AREAS

AFFECTED ENVIRONMENT

This section identifies the roadless areas which meet the minimum criteria for potential inclusion in the National Wilderness System. Identifying this potential does not imply that areas should or should not be recommended for designation as Wilderness, but is intended to portray the remaining undeveloped portions of the National Forest for which Wilderness is a future option.

In general, once an area is roaded it is no longer available for consideration as potential Wilderness. Depending on when and how the activity was conducted, evidence of previous timber harvest, abandoned habitations and historic mining evidence do not necessarily result in an irreversible removal of land from future consideration as Wilderness.

The minimum criteria for inclusion as a roadless area in the evaluation of Wilderness potential are established in the Wilderness Act of 1964 and in subsequent regulation and policies. To qualify, an area must contain at least 5,000 acres of undeveloped land which does not contain improved roads maintained for travel by passenger-type vehicles. However, areas less than 5,000 acres may qualify if they are a self-contained ecosystem such as an island, are contiguous to existing Wilderness, or are ecologically isolated by topography and manageable in a natural condition.

The roadless inventory makes known the extent of the roadless resource, and provides data for use by managers, legislators and others to formulate land management proposals. Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped or natural areas, such as required for old-growth habitat, scenic backdrops or for primitive recreation. Roadless areas identified in the inventory which are outside of existing designated Wilderness may be considered for Wilderness designation or may be managed for a wide range of other resource management activities.

Current Situation

The Tongass National Forest is unique in the National Forest System because of its large size (17 million acres) and the fact that only small areas where communities are developing, and road construction and timber harvest have occurred, are "developed" to any noticeable degree. At various times in the past, "boom and bust" development (associated with fox farming, salmon canneries, mining, and military activity) resulted in the temporary development and occupation of many small areas that have since been largely reclaimed by nature. Presently occupied and developed areas total only 1.2 million acres, or seven percent of the Tongass. Southeast Alaska residents, who number only

60,000, are virtually surrounded by land they consider "wilderness". Routine travel and ordinary outdoor recreation activities may require a higher degree of skill, risk-taking and self-reliance than are typically required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike.

The second Roadless Area Review and Evaluation (RARE II), completed in 1979 concurrent with the Tongass Land Management Plan, identified over 700 individual watersheds as completely roadless, totaling some 13 million acres. ANILCA designated 5.4 million acres as Wilderness in 1980. Two significant areas, South Etolin Island and the Karta River drainage, and three small areas adjacent to the South Prince of Wales Wilderness, Stikine-LeConte Wilderness, and Tebenkof Bay Wilderness, were proposed as Wilderness in ANILCA debate, but were not designated as Wilderness. Current direction for these areas is to maintain their present condition until completion of the Forest Plan Revision.

The 106 roadless areas identified in the Forest Plan revision total about 10.4 million acres. Their size, and the amount of each area that is tentatively suitable timber is shown in Table 3-65. Their location and relative size is depicted in the "Roadless Areas" map in the map packet.

Several characteristics of roadless areas on the Tongass represent potentials unavailable elsewhere in the National Forest System. The Tongass has very large undeveloped land areas that could potentially be managed as Wilderness or in an unroaded condition. Several portions of the Forest constitute contiguous roadless areas that exceed one million acres, and thus represent large, unfragmented wildlife habitats and outstanding opportunities for solitude.

Many of the Tongass roadless areas represent wildlife habitats, ecosystems, and visual character that exist nowhere else in the National Forest System, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forest, ice fields, and glaciers. Most of these features are represented in the existing 5.4 million acres designated as Wilderness. Many of these areas are remote, difficult to access for primitive recreation, and many contain other important resource values such as timber, minerals, and salmon-producing streams. Of the 3,053,000 acres of tentatively suitable forest land on the Tongass outside Wilderness, 2,400,000 acres, or 78 percent, is within roadless areas. (See Table 3-65). For comparison, existing Wilderness on the Tongass contains approximately 1,134,000 acres of tentatively suitable forest land.

Figure 3-31 displays the make-up of roadless lands on the Forest in terms of productive and non-productive forest lands, and non-forested lands including ice and snowfields, rock, muskeg, alpine tundra and other non-forested categories.

TABLE 3-65
TONGASS NATIONAL FOREST ROADLESS AREAS

Number	Area Name	National Forest Acres	Non-NF Acres	Tentatively Suitable Acres	Tentatively Suitable %
	Stikine Area				
201	Fanshaw	48,869	20	20,831	42.6
202	Spires	536,653	723	33,551	6.3
203	Thomas	4,517	180	1,099	24.3
204	Madan	68,998	3,960	22,366	32.4
205	Aaron	78,884	0	7,219	9.2
206	Cone	128,574	0	4,229	3.3
207	Harding	177,598	0	23,188	12.9
208	Bradfield	212,872	0	10,779	5.1
209	Anan	37,933	0	8,063	21.1
210	Frosty	41,395	0	11,411	27.6
211	North Kupreanof	116,666	21,957	19,928	17.1
212	Missionary	14,005	0	3,683	26.3
213	Five Mile	19,438	859	5,259	27.1
214	South Kupreanof	209,957	0	45,602	21.7
215	Castle	49,360	0	10,972	22.2
216	Lindenberg	22,797	5,540	7,920	34.7
217	Green Rocks	10,380	2,059	3,360	34.9
218	Woewodski	10,376	20	5,379	51.8
219	North Mitkof	5,876	3,837	1,879	31.9
220	East Mitkof	10,250	100	3,083	33.3
223	Manzanita	7,850	220	2,684	34.2
224	Crystal	19,293	2,501	5,764	29.8
225	Kadin	1,623	0	1,122	69.1
226	Greys	361	0	301	83.3
227	North Wrangell	11,624	2,840	4,522	38.9
229	South Wrangell	71,173	4,817	22,697	31.8
231	Woronkofski	9,773	0	3,545	36.3
232	North Etolin	46,887	0	17,188	36.6
233	Mosman	57,974	0	21,564	37.2
234	South Etolin	113,031	0	36,356	32.2
235	West Zarembo	6,945	0	2,355	33.9
236	East Zarembo	8,990	0	2,937	32.6
237	South Zarembo	32,288	0	10,333	32.0
238	Kashevarof Islands	5,585	140	2,600	48.4
239	Keku	12,126	20	5,311	43.8
240	Security	41,105	480	15,849	38.6
241	North Kuiu	9,741	0	6,514	66.8
242	Camden	54,730	0	23,973	43.8
243	Rocky Pass	78,976	580	28,356	35.9
244	Pillars	28,570	40	16,684	58.4
245	East Kuiu	46,271	0	23,880	51.6
246	South Kuiu	124,065	20	54,469	43.9

TABLE 3-65 (continued)
TONGASS NATIONAL FOREST ROADLESS AREAS

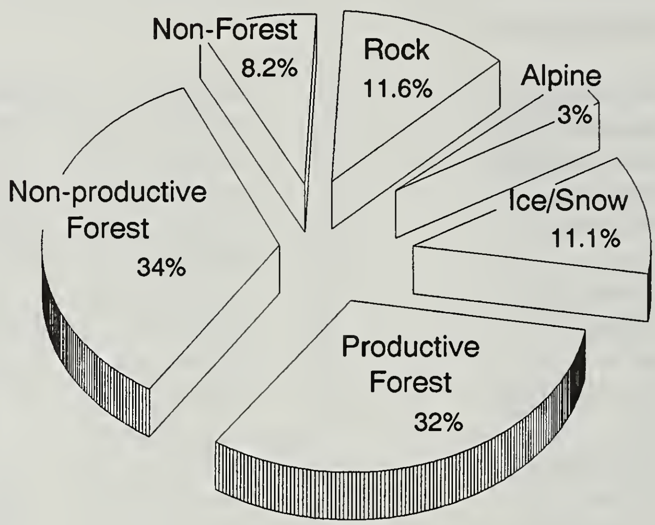
Number	Area Name	National Forest Acres	Non-NF Acres	Tentatively Suitable Acres	Tentatively Suitable %
	Chatham Area				
301	Juneau-Skagway Icefield	1,209,199	60	32,571	0.0
302	Taku Snettisham	736,112	159	71,884	9.7
303	Sullivan	66,657	20	11,547	16.4
304	Chilkat-W. Lynn	207,277	4,240	46,896	21.8
305	Juneau Urban	104,970	699	32,133	30.6
306	Mansfield Peninsula	52,994	60	23,324	44.0
307	Greens Creek	48,078	839	15,472	32.0
308	Windham-Port Houghton	240,296	481	113,789	47.3
309	Juneau Islands	7,051	139	3,787	53.7
310	Douglas Island	27,390	40	9,696	35.2
311	Chichagof	37,238	32,201	150,060	23.6
312	Trap Bay	22,008	20	10,074	45.4
314	Point Craven	11,837	40	4,095	33.3
317	Point Augusta	19,479	0	11,259	57.7
318	Whitestone	6,100	40	2,380	37.7
319	Pavlof-East Point	10,900	0	7,100	65.1
321	Tenakee Ridge	24,262	6,143	5,801	23.9
323	Game Creek	67,046	21,566	21,835	32.5
324	Pleasant Island	12,239	0	3,020	25.0
325	Freshwater Bay	63,206	8,823	23,961	37.8
326	North Kruzof	31,170	20	8,452	27.0
327	Middle Kruzof	15,540	0	5,827	37.4
328	Hoonah Sound	97,257	20	24,406	25.1
329	South Kruzof	56,701	0	7,468	13.1
330	North Baranof	341,417	2,200	63,396	18.5
331	Sitka Urban	120,536	17,610	8,452	6.9
332	Sitka Sound	19,475	1,459	7,298	37.4
333	Redoubt	75,732	3,739	22,694	29.9
334	Point Alexander	126,120	516	12,660	9.9
338	Brabazon Addition	500,374	0	0	0.0
339	Yakutat Forelands	305,871	30,141	58,470	19.1
341	Upper Situk	61,722	418	30,203	48.9

TABLE 3-65 (continued)
TONGASS NATIONAL FOREST ROADLESS AREAS

Number	Area Name	National Forest Acres	Non-NF Acres	Tentatively Suitable Acres	Tentatively Suitable %
	Ketchikan Area				
501	Dall Island	108,260	29,069	51,578	47.6
502	Suemez Island	36,327	837	20,663	20.1
503	Outer Islands	102,881	240	46,488	45.1
504	Sukkwan	46,145	7,111	13,943	31.2
505	Soda Bay	76,596	17,867	29,318	38.2
507	Eudora	233,933	20,495	95,161	40.6
508	Christoval	7,750	0	5,803	74.8
509	Kogish	76,175	9,697	32,776	43.7
510	Karta	121,440	8,224	51,601	42.5
511	Thorne River	112,460	0	54,972	48.9
512	Ratz	8,349	0	4,146	49.7
513	Sweetwater	11,104	0	5,382	48.5
514	Sarkar	73,565	160	35,335	48.0
515	Kosciusko	70,216	381	38,621	55.0
516	Calder	12,687	0	9,575	75.5
517	El Capitan	43,604	40	23,316	53.4
518	Salmon Bay	36,366	60	15,881	43.7
519	Polk	149,205	23,819	53,605	35.9
520	Kasaan	8,536	140	3,227	38.4
521	Duke	46,785	60	7,695	16.2
522	Gravina	38,952	22,889	16,578	42.5
523	South Revilia	71,358	640	23,807	17.2
524	Revilla	138,393	22,870	50,638	36.6
525	Behm Islands	2,042	3,484	1,361	66.7
526	North Revilla	163,771	1,039	61,763	37.7
527	Neets	6,315	0	2,667	42.2
528	Cleveland	193,473	8,512	83,219	43.0
529	North Cleveland	114,158	20	43,509	38.1
530	Hyder	128,585	1,000	11,882	9.2
531	Nutkwa	59,318	4,978	29,311	49.4
532	Fake Pass	798	0	738	92.4
577	Quartz	149,107	640	0	0.0
Total For All Areas		**10,389,991**	**366,878**	**2,400,000**	**21.0**

FIGURE 3-31

ECOSYSTEM TYPES WITHIN ROADLESS AREAS



Historic Trends

Until the Second World War, virtually the entire Tongass National Forest was unroaded and undeveloped with the exception of a few small communities and isolated fox farms. Significant timber harvest did not begin until the early 1950's with the opening of pulp mills and the negotiation of the long-term timber sale contracts. Since 1900 about 500,000 acres have been harvested, with most of this harvest occurring since 1954. Since the approval of the Tongass Land Management Plan in 1979, about 93,000 acres of National Forest land has been altered by timber harvest, road construction, or other actions. Currently, 90 percent of nonwilderness National Forest lands are roadless.

Appendix C describes the attributes and resource potentials of each area, evaluates the area's capability and availability for management as Wilderness or allocation to other roadless management prescriptions, and displays the effects of the alternatives on each.

Future Trends

Public recreation use of Southeast Alaska's roadless undeveloped lands is light but increasing. Modern technology has made available improved rainwear, camping equipment, high quality ocean kayaks, portable marine radios, and other gear which respond to new trends, or lead to increased use. Continued tourism marketing may also lead to increased public use of wilderness and roadless area recreation opportunities. Demand for natural areas to provide clean water and air, reduce effects of global warming, and to counter deforestation in other countries is also increasing as these global issues increase in importance.

ROADLESS AREAS

ENVIRONMENTAL CONSEQUENCES

Wilderness Area Proposals

Alternatives A and E recognize the expressed intent of the House of Representatives in passage of H.R. 987 which would designate 1.8 million acres of roadless lands as wilderness. If all recommended areas were designated by Congress, 7.3 million acres of the Tongass National Forest would be managed as wilderness. There would be 29 separate Wildernesses on the Forest (fifteen additional separate areas and eight additions to existing areas). No additional wilderness is recommended in the other alternatives. All areas for which the public expressed interest in Wilderness consideration during scoping are included within H.R. 987. The acres and tentatively suitable forest lands in each of the areas is displayed in Table 3-66.

Figure 3-32 displays the make-up of the 1.8 million acres of wilderness proposed in Alternatives A and E, including productive and non-productive forest lands, and non-forested lands including ice and snowfields, rock, muskeg, alpine tundra and other non-forested categories. Addition of these areas to wilderness would increase the amount of tentatively suitable forest lands in wilderness to 1,771,635 acres, or about 58 percent of the total tentatively suitable forest lands on the Tongass. The relative proportions of forested versus non-forested lands in Wilderness increases slightly since 78 percent of the proposed area is forested compared to 52 percent in existing wilderness. Compared to the existing 14 Wildernesses on the Tongass, the proposed areas, in general, tend to represent lower elevation sites with less alpine, rock and ice and more forested lands and islands. Geographically, the 23 areas are widely distributed throughout the non-Wilderness portion of the Forest. The designated wilderness on the Tongass would continue to be highly representative of the variety of ecosystems and vegetative types found in Southeast Alaska.

Comprising 11 percent of the Tongass National Forest and 17 percent of the currently roadless area on the Tongass, the proposed wilderness areas range in size from 3,900 acres on Sullivan Island to 352,200 acres surrounding Upper Hoonah Sound and Lisianski Inlet on Chichagof Island. Eight of the proposed areas are adjacent to existing wilderness.

The proposed Wildernesses contain 637,635 acres of tentatively suitable forest lands, or about 21 percent of the tentatively suitable forest lands on the Tongass. Five of the areas (Calder/Holbrook, Sarkar Lakes, Outside Islands, Nutkwa, and Kegan Lake) which have a total of 131,558 acres of tentatively suitable forest lands, are located within the primary sale area for the Ketchikan Pulp Company (KPC) long-term sale. Six areas (Chichagof, Kadashan, Trap Bay, Point

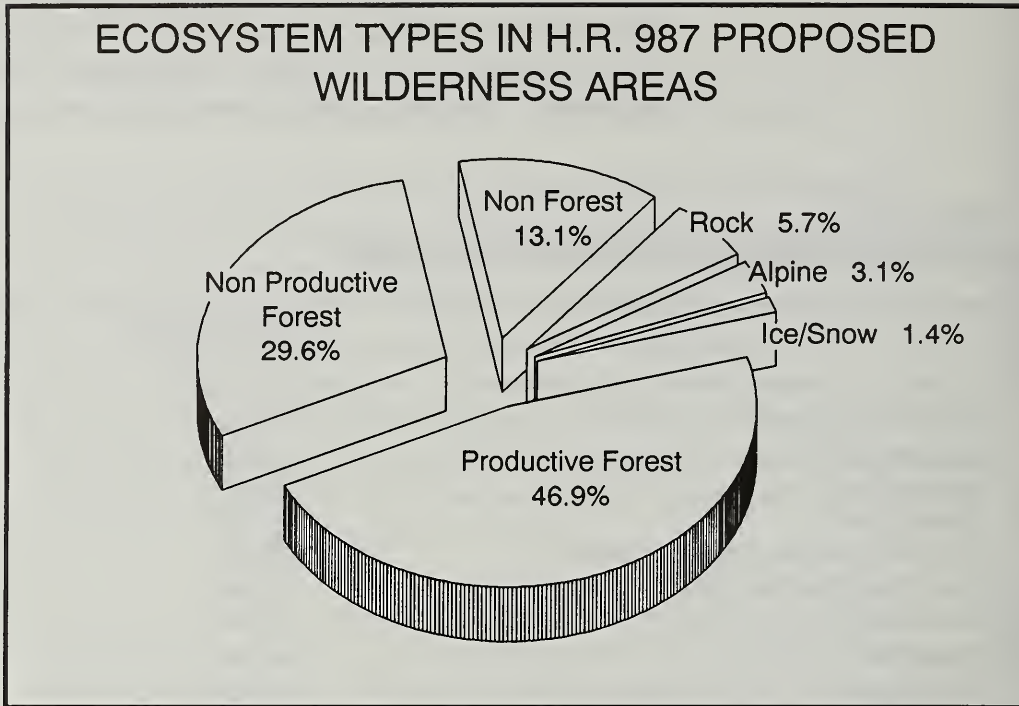
acres of suitable forest lands are within the primary sale area of the Alaska Pulp Corporation (APC) long-term sale. Designation as wilderness would reduce the annual sale quantity (ASQ) on the forest by approximately 91 million board feet with 349,849 acres of suitable forest lands included in the APC 1986-90 and the KPC 1989-94 operating plans becoming unavailable for harvest.

TABLE 3-66
AREAS PROPOSED AS WILDERNESS IN H.R. 987

	National Forest Lands (Acres)	Tentatively Suitable Forest Lands (Acres)
Yakutat Forelands	220,268	48,732
Sullivan Island	4,032	2,021
Berners Bay	46,145	9,044
Young Lake	18,702	7,889
Pleasant/Lemesurier/Inian Islands	23,154	9,318
Point Adolphus/Mud Bay	73,346	22,621
Chichagof	347,729	72,568
Kadashan	34,044	13,493
Trap Bay	6,667	3,158
Chuck River	124,539	61,572
Port Houghton/Sandborn Canal	58,915	24,903
South Kuiu	191,532	92,679
Rocky Pass	75,734	27,543
West Duncan Canal	134,627	37,108
South Etolin Island	83,642	27,516
Naha River	31,794	16,075
Calder/Holbrook	68,693	40,643
Sarkar Lakes	25,650	11,409
Anan Creek	38,415	8,343
Outside Islands	98,572	42,261
Karta River	39,881	21,494
Nutkwa	52,654	28,070
Kegan Lake	24,655	9,175
Total	1,823,390	637,635

Source: Revision Database, Q185, Q213, 3/90;
RO-Geometronics provided the digitized total acreage.

FIGURE 3-32



The 23 proposed Wildernesses included in H.R. 987 are described briefly below:

Yakutat Forelands. (A portion of Roadless Area 339 - Yakutat Forelands - see Appendix C.) This 220,268 acre area includes the low-elevation glacial outwash plain along the Gulf of Alaska extending from the Dangerous River to the boundary of Glacier Bay National Park and Preserve along the Alsek River and Dry Bay, 25 miles east of the community of Yakutat. The extensive sandy beach fringe and the shores of the Alsek at Dry Bay have numerous developments and long established patterns of motorized use and access for hunting and traditional fishing use. There are several airstrips in the area. The area adjoins the Russell Fiord Wilderness. Residents of the mostly native community of Yakutat (population 600) generally appear to desire some form of management that would emphasize maintenance of fish and wildlife habitat and retain the opportunity for traditional access and use. (The Southeast Conference proposal referred to as Yakutat Forelands excludes LUD II lands, Dry Bay, and the Pacific beaches contained in H.R. 987.)

Berner's Bay. (Portions of Roadless Areas 301 and 305 - Skagway-Juneau Icefield and Juneau Urban - see Appendix C.) This 46,145 acre area includes the lower valleys of the Berners, Lace and Gilkey Rivers on the east side of the Lynn Canal, about 40 miles north of Juneau, and about five miles from the terminus of the Juneau road system. The area has important fishery values,

and is used for hunting and viewing brown bear, moose, and mountain goat. It is immediately adjacent to two significant mineralized areas (the Jualin complex of patented claims, and the Kensington complex) both of which have approved operating plans for access roads and exploration. The area includes potential road corridors to Berner's Bay and for a proposed road to Haines. Recreation use of the Berner's Bay area is currently high. The area also contains several permitted recreation cabins.

Young Lake. (A portion of Roadless Area 307 - Green's Creek - see Appendix C.) This 18,702 acre area occupies the drainage of Admiralty Creek on the north end of Admiralty Island, and includes Young Lake and Admiralty Cove. These popular recreation destinations are the site of three public recreation cabins and a trail managed by the Forest Service. The Young Lake area is popular for fishing and deer hunting, and supports abundant brown bear. It is adjacent to a large silver mining operation at Green's Creek.

Chichagof. (A portion of Roadless Area 311 - Chichagof - see Appendix C.) This area includes 347,729 acres on Chichagof Island, including upper Hoonah Sound and the Lisianski River. (Other proposals for Wilderness in this area use the names Lisianski River, Goose Creek, and Lisianski-Upper Hoonah Sound and differ in both boundaries and size.) Part of the area adjoins the West Chichagof-Yakobi Wilderness. Many streams and rivers in this area have very high value fishery habitat which contributes significantly to northern Southeast Alaska commercial and subsistence fisheries, and supports an important recreational and commercial charter boat industry. High value wildlife habitat is found throughout the area, and both deer and brown bear sport hunting are important uses. Subsistence activities occur in the area. The Chichagof Roadless Area has mineralization of potential value in 19 locations and includes several proposed road corridors related to the Alaska Pulp Company Operating Plan for 1986-1990. (The Southeast Conference proposal includes portions of Lisianski Inlet not included in H.R. 987. A separate Southeast Conference area known as Goose Flats is included within the H.R. 987 area.)

Kadashan. (A portion of Roadless Area 311 - Chichagof - see Appendix C.) This 34,044 acre area occupies the entire drainage of the Kadashan River on Chichagof Island, approximately five miles by water across Tenakee Inlet from the community of Tenakee Springs. The Kadashan River and its tributaries have high value fishery habitat and the area is an important local recreational and subsistence fishing and hunting area. The partially completed road from Corner Bay up the Kadashan drainage receives some motorized recreation use primarily associated with deer and brown bear hunting. The road has been a source of local controversy.

Trap Bay. (A portion of Roadless Area 312 - Trap Bay - see Appendix C.) This 6,667 acre area is located on Chichagof Island on the south side of the entrance

to Tenakee Inlet about 10 miles from the community of Tenakee Springs. The single small drainage has high fish habitat value and is used for subsistence and occasional recreational fishing, as well as for deer and brown bear hunting. Trap Bay is the site of a proposed log transfer facility and a road connection related to the Alaska Pulp Company 1986-90 Operating Plan. The bay itself is a popular anchorage for subsistence, commercial and recreational activity, and is used by residents of Tenakee Springs. There is a stone quarry on the west side of the area.

Chuck River. (Portions of Roadless Areas 204 and 205 - Madan and Aaron - see Appendix C.) This 124,539 acre area stretches along the mainland coast from the Chuck River drainage and Windham Bay north across Holkam Bay (also known as Sumdum Bay) and includes a portion of the Snettisham Peninsula. The area is about 10 miles northeast of the logging community of Hobart Bay and about 70 miles south of Juneau. It is adjacent to the Tracy Arm-Fords Terror Wilderness on the east, and abuts areas of current and planned logging activity on the south and southeast. There are 25 known mineral deposits including seven previously-producing mines, and 250 unpatented mining claims. Recreation use has increased with the development of nearby Hobart Bay and private lands within this area. Subsistence use is moderate and would increase if Hobart Bay became a stable long-term community. Fish habitat values are high and the area is a large producer of pink, chum and coho salmon. Bear and furbearers are important recreational and subsistence resources. (The Southeast Conference proposal excludes Libby Creek, Dry Bay, and Snettisham Peninsula portions of the H.R. 987 area.)

South Kuiu. (This area is identical with Roadless Areas 244, 245 and 246 - Pillars, East Kuiu, South Kuiu - see Appendix C.) This area is comprised of 191,532 acres essentially surrounding the Tebenkof Bay Wilderness on Kuiu Island about 25 miles south of the community of Kake, and five miles from the logging camp at Rowan Bay. Its shoreline is characterized by numerous bays and islands. The Bay of Pillars on the north is easily accessible from nearby Rowan Bay and from the logging road along the north boundary. Fishery values are high; numerous bays and anchorages provide fishing and subsistence opportunities for fishing and bear hunting for residents of Kake, Port Protection, Point Baker and other communities. The area is currently closed to deer hunting. Portions of this area are included in the APC Long-term Sale Area. (Southeast Conference proposal includes only the Conclusion, Sumner and Strait Islands portion of the H.R. 987 area.)

Rocky Pass. (Identical with Roadless Area 243 - Rocky Pass - see Appendix C.) Rocky Pass comprises 75,734 acres on both sides of the saltwater channel which separates Kuiu Island and Kupreanof Island, about 15 miles south of the community of Kake. This area has high fish and wildlife values, and is heavily used by residents of Kake for subsistence hunting. Big John Bay, which has a

Forest Service recreation cabin and a trail connecting to the road system on Kupreanof Island, is popular for both recreation and subsistence use.

West Duncan Canal. (Portions of Roadless Area 214 and 215 - South Kupreanof and Castle - see Appendix C). This 134,627 acre area is located along the west side of Duncan Canal, a long saltwater inlet on Kupreanof Island. It adjoins the Petersburg-Duncan Salt Chuck Wilderness, and includes Woewodski Island at the entrance to the Duncan Canal. High value fish habitat supports world-class fishing for steelhead, coho salmon and cutthroat trout. West Duncan Canal is also know for its excellent crab and shrimp fisheries. Sitka black-tailed deer, black bear and furbearers are supported by high value wildlife habitat. The area is also considered important for migratory waterfowl. The West Duncan Canal area receives high recreation and subsistence use from Petersburg (10 miles east), and has nine Forest Service recreation cabins and three short trails. Motorboat access is very common. Some 400 active mining claims and three past production sites can be found in this area including the Castle Island barite deposit. Several abandoned mines are considered visitor attractions.

South Etolin Island. (A portion of Roadless Area 234 - South Etolin - see Appendix C.) This area comprises 83,642 acres on the south end of Etolin Island and several smaller islands about midway between Ketchikan and Wrangell on the Inland Passage, and about 15 miles north of the logging community at Thorne Bay across Clarence Strait. Although this area was recommended as Wilderness in the Tongass Land Management Plan, it was not designated as Wilderness by ANILCA. The area's main attractions are its moderate fish and wildlife values and its value as a popular subsistence use area for the residents of Wrangell. Elk have been introduced to Etolin Island and may have become established within the area. The multitude of small islands and passages provide numerous anchorages for recreation activities and small boat travel opportunities. These same features have led to study of potential sites for mariculture activities.

Naha River. (A portion of Roadless Area 526 - North Revilla - see Appendix C.) The Naha River drainage is a 31,794 acre area located on Revillagigedo Island about 20 miles north of Ketchikan, and directly adjacent to the small community of Loring (population 20). The area is within the City and Borough boundary of Ketchikan, which is not classified as a subsistence community, but the area receives some subsistence use from other communities. Naha River includes a large intertidal lagoon, or salt chuck, and numerous other large lakes which are accessible by floatplane. Motorized skiffs use the lagoon and several lakes. The area has high value fish habitat and receives both resident and non-resident fishing use, mainly for steelhead, coho salmon and cutthroat trout. Recreation facilities include an extensive trail system, six Forest Service recreation cabins, and the Orten Scout Ranch on private land. Due to its accessibility from Ketchikan and to the scenic and fishery values of the area, about one-third of the cabin use is by non-residents of Alaska.

Calder/Holbrook. (Includes Roadless Area 515 and 516 - Kosciusko and Calder - see Appendix C.) The 68,693 acre Calder/Holbrook area is located on the west side of north Prince of Wales Island and includes the unroaded portion of Kosciusko Island, the west shore of the El Capitan Passage, and numerous small islands. The area has high fish habitat values, and is used by residents of several nearby communities including Craig, Edna Bay, Point Baker and Klawock for both recreation and subsistence. In recent years, extensive roading and timber harvest of surrounding areas have focused significant local attention on the future of the Calder/Holbrook area. The area contains a number of mining claims and seven known mineral deposits including past producers of marble and zinc. Extensive limestone caverns have potential for recreation use and scientific study. (Southeast Conference proposal includes Conclusion, Sumner, and Strait Islands in its proposal for the Calder/Holbrook area.)

Sarkar Lakes. (A portion of Roadless Area 514 - Sarkar - see Appendix C.) The 25,650 acre Sarkar Lakes area is on north Prince of Wales Island between Whale Passage and El Capitan Passage. The area contains numerous interconnected lakes and canoeing is a rapidly increasing activity. Because of the waterways and adjacent logging road systems, access to this area for recreation and subsistence uses is relatively easy for residents of Thorne Bay, Coffman Cove and other small communities on Prince of Wales Island. Public use is increasing. Two Forest Service recreation cabins are accessible by floatplane. Fish habitat and wildlife habitat quality is high, and the lakes provide extensive sockeye salmon rearing areas.

Outside Islands. (Area is identical to Roadless Area 503 - Outer Islands - see Appendix C.) The Outside Islands consist of Noyes, Lulu, Baker, San Fernando and numerous smaller islands, totaling 98,572 acres, off the west coast of Prince of Wales Island. Access is primarily by boat from Craig and Klawock about 10 miles to the east. Baker and Noyes Islands face the open Pacific and have a variety of features associated with high energy seas, including sea stacks and large sandy beaches. These attractions, however, are difficult to access directly due to the absence of safe anchorages on the outer coast. Steamboat Bay is the most popular recreation anchorage. Fish and wildlife habitat values are moderate, and the area receives some subsistence use. There are several known mineral deposits and unpatented mining claims.

Karta River. (A portion of Roadless Area 510 - Karta - see Appendix C.) This 39,881 acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about five miles from the communities of Kasaan and Hollis. Hollis is the only community on Prince of Wales Island served by the Alaska Marine Highway System, about three hours by ferry from Ketchikan. The area was considered for Wilderness during ANILCA debates, but was not included in the ANILCA Wilderness designations. The Karta River area contains high value fish habitat for coho salmon. The two major lakes, Salmon Lake and

Karta Lake, are important spawning sites for sockeye salmon. One mine previously produced gold, and there are other known mineral deposits. Recreation use is high; the four Forest Service recreation cabins are in such demand that reservations are managed using a lottery system. Subsistence use is also very high.

Nutkwa. (Includes nearly all of Roadless Area 531 - Nutkwa - see Appendix C.) This 52,654 acre area is adjacent to the west side of the South Prince of Wales Wilderness on Prince of Wales Island about 15 miles from the community of Hydaburg. Nutkwa has high fish habitat values with important production of coho and sockeye salmon. Subsistence use of sockeye salmon is significant, although overall subsistence and recreation use is moderate to light. There are several copper and lode gold mineral occurrences and one former producing mine. (The Southeast Conference proposal excludes the south half of the area proposed in H.R. 987.)

Kegan Lake. (A portion of Roadless Area 507 - Eudora - see Appendix C.) This 24,655 acre area is located on the northeast side of the South Prince of Wales Wilderness at the head of Moira Sound on Prince of Wales Island, about 25 air miles southwest of Ketchikan. The area contains Kegan Lake and a number of other lakes and streams which support a world class recreational fishery for coho salmon, steelhead, and rainbow trout. High value wildlife habitat for black bear, Sitka black-tailed deer and migratory waterfowl are present. This area contains 30 patented mining claims and mining for copper and marble has occurred in the past. Recreation facilities include two Forest Service recreation cabins, numerous anchorages and several trails. Recreational sportfishing and hunting area high.

Anan Creek. (Identical with Roadless Area 209 - Anan - see Appendix C.) This 38,415 acre area is located on the Cleveland Peninsula adjacent to Bradfield Canal and Ernest Sound about 30 miles southeast of the community of Wrangell. It includes the Anan Creek drainage which contains Anan Lake, Boulder Lake and numerous small lakes. The Anan Creek system is one of the premier salmon producing streams in Southeast Alaska containing one of Southeast's largest pink salmon runs, as well as sockeye salmon, cutthroat and rainbow trout, and Dolly Varden. The Anan Creek fishery is important commercially and for subsistence; recreational fishing use is increasing. Deer, black bear and grouse are important subsistence and recreational resources, and viewing of the bear concentration during salmon runs is a major recreation activity. A powerline from the Tyee Hydroelectric Project crosses the area. Recreation use is high with two Forest Service recreation cabins, a bear viewing observatory, and numerous trails. Anan Bay is a heavily used anchorage.

Point Adolphus-Mud Bay. (A portion of Roadless Area 311 - Chichagof - see Appendix C.) This 73,346 acre area occupies the north end of Chichagof Island

about 10 miles west of the community of Hoonah and a few miles from the small community of Elfin Cove. Gustavus and Glacier Bay National Park are about 10 miles north across Icy Strait. Extensive estuarine areas and salmon spawning streams make this an important area for subsistence, recreational and commercial fishing. Important habitat for waterfowl and brown bear are located here. Marten and beaver are also important in the area. Subsistence use and recreation occur in Mud Bay, Idaho Inlet and numerous smaller bays and anchorages as well as on upland areas.

Pleasant/Lemesurier Islands. (Includes Roadless Area 324 and portions of 311 - Pleasant Island and portions of Chichagof - see Appendix C.) This 23,154 acre Pleasant/Lemesurier area consists of Pleasant Island, Lemesurier Island and the Inian Islands in Icy Strait between Chichagof Island and Glacier Bay National Park. Although no major fish streams are located on the islands, there is some deer and grouse habitat, and subsistence use does occur.

Sullivan Island. (A portion of Roadless Area 303 - Sullivan - see Appendix C.) This 4,032 acre island lies in the Lynn Canal about 20 miles south of Haines off the coast of the Chilkat Range. The Sullivan area contains limited fish habitat and no known anadromous fish streams. It has good habitat for deer, mink and marten. Recreation and subsistence uses are light, with most use originating in Haines.

Port Houghton/Sanborn Canal. (A portion of Roadless Area 308 - Windham/Port Houghton - see Appendix C.) This 58,915 acre area is located on the mainland about 10 miles southeast of the logging community of Hobart Bay, and is adjacent to the Tracy Arm-Fords Terror Wilderness to the east. The area contains three important fish producing streams which contain pink, chum and coho salmon with steelhead, rainbow trout and Dolly Varden. The area has large populations of black bear, mountain goats, and provides important waterfowl habitat. Deer populations are currently low. Sanborn Canal and Port Houghton support commercial salmon, crab and halibut fisheries. Recreation and subsistence use are generally increasing as a result of the development of Hobart Bay.

Southeast Conference Areas

In addition, a number of areas, including portions of many of the wildernesses proposed in H.R. 987, have been identified by the Southeast Conference as areas to be "protected with no timber harvest." These areas are not described here in detail; they are similar to the proposed H.R. 987 wildernesses of the same names. Table 3-67 displays the 12 areas originally proposed by the Southeast Conference in March, 1989, and endorsed by the Governor of the State of Alaska.

TABLE 3-67
SOUTHEAST CONFERENCE 12 "PROTECTED AREAS," MARCH, 1989

Area	*National Forest Lands (Acres)*	*Tentatively Suitable Forest Lands (Acres)*
Yakutat Forelands	147,932	45,970
Berners Bay	45,728	49,044
Young Lake	18,603	7,889
Lisianski River/Upper Hoonah Sound	145,737	27,039
Goose Flats	23,465	4,442
Kadashan	34,300	13,493
Trap Bay	6,519	3,158
Chuck River	74,796	32,658
Mt. Calder/Holbrook	53,246	42,758
Outside Islands	76,092	38,890
Karta	39,761	21,494
Nutkwa	21,449	11,482
Total Federal Acres	**687,628**	**258,317**

Source: Revision Database, Q 213, 247B, 3/90; RO-Geometronics provided the digitized total acres)

In February, 1990 the Southeast Conference board voted to revise its proposal, adding four areas and a total of 146,000 acres, but decreasing the amount of tentatively suitable forest lands contained in the proposal. The resulting changes in the Southeast Conference proposal are shown in Table 3-68.

TABLE 3-68
REVISED SOUTHEAST CONFERENCE 16 "PROTECTED AREAS," FEBRUARY 2, 1990

Area	*National Forest Lands (Acres)*	*Tentatively Suitable Forest Lands (Acres)*
Yakutat Forelands	147,932	45,970
Berners Bay	45,728	8,626
Young Lake	18,603	7,890
Lisianski River/Upper Hoohah Sound	145,737	13,514
Goose Flats	23,465	1,440
Kadashan	34,300	5,338
Trap Bay	6,519	1,740
Chuck River	74,796	14,262
Mt. Calder/Holbrook	53,246	12,528
Outside Islands	76,092	33,771
Karta	39,761	5,538
Nutkwa	21,449	5,020
Naha	22,683	15,995
Pleasant/Lemesurier	26,979	9,040
Pt. Aldolphus/Mud Bay	89,276	13,871
Mansfield Peninsula	14,986	6,550
Total Federal Acres	**841,552**	**201,093**

Source: Revision Database, Q 213, 247B, 3/90; RO-Geometronics provided the digitized total acres)

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Table 3-69 displays how the roadless lands were allocated to individual management area prescriptions in each alternative. Table 3-70 summarizes the allocations by prescription groupings. The prescriptions are grouped to indicate the potential for intensive development, moderate development, and retention of the natural setting (and future wilderness potential). Implementation will determine the location, timing or intensity of actual project activities within the management area. In Appendix C, activities associated with decisions based on the Supplemental Environmental Impact Statement for the 1989-1994 Alaska Pulp Corporation long-term sale, and the EIS for 1986-90 operating period of the Ketchikan Pulp Company, are identified more specifically in descriptions and environmental consequences for individual roadless areas.

In general, management prescriptions which allow intensive development include timber production with associated road and log transfer facility construction in areas where suitable forest lands occur. Management prescriptions which allow moderate development also allow the construction of roads, harvesting of timber and construction of recreation facilities, but place more constraints on the extent and visual impact of such activities. The management prescriptions which emphasize the retention of the natural setting and undeveloped character of the area generally do not allow timber harvesting or the development of major recreation facilities, although roads linking transportation systems may occur.

Not all areas subject to development allowed by the management area prescription would actually be developed. The analysis at the forest-wide level serves primarily as a general indication of the effects of the alternatives on the future potential to recommend roadless areas for designation as Wilderness. In addition, not all of the effects of the alternatives occur at once. The maximum amount of road construction and timber harvest that occurs in the first decade in any alternative is 2,930 miles of road and 185,000 acres of harvest (Alternative D). This indicates that about 90 percent of the currently unroaded lands would still be roadless at the time of the next Forest Plan Revision, when their potential as Wilderness could be considered again.

TABLE 3-69
ALLOCATION OF TOTAL ROADLESS AREA (10,389,991 ACRES) TO PRESCRIPTIONS BY ALTERNATIVE

Prescriptions		*Alt A*	*Alt B*	*Alt C*	*Alt D*	*Alt E*	*Alt F*	*Alt G*
NATURAL SETTING								
Recommended Wilderness	(RW)	1,818,316	0	0	0	1,818,316	0	0
Beach Fringe	(BF)	270,650	443,920	144,528	176,487	95,977	136,209	135,203
National Monument	(NM)	162,413	162,413	162,413	162,413	162,413	162,413	162,413
Primitive Recreation	(PR)	3,603,370	4,545,386	3,137,428	1,526,553	2,902,222	3,789,972	3,753,583
Municipal Watershed	(MW)	9,733	9,733	9,733	9,733	9,733	9,733	9,733
Old Growth	(OG)	954,120	295,630	588,586	51,059	436,975	537,639	521,988
Semi-Primitive	(SP)	931,077	1,578,358	619,814	3,295,190	420,452	582,998	540,833
Subtotal		7,749,578	7,035,440	4,662,505	5,221,435	5,845,987	5,124,964	5,023,753
MODERATE DEVELOPMENT								
Experimental Forest	(EF)	30,200	39,466	13,821	13,821	13,821	13,821	13,821
Scenic Viewshed	(SV)	697,354	846,498	511,358	198,652	421,258	468,056	457,639
Stream/Lake Riparian	(SL)	54,934	67,675	212,707	182,753	161,125	184,117	193,643
Visual Timber	(VT)	992,228	495,072	906,101	154,146	714,913	846,319	858,850
Roaded Nat. Rec.	(RN)	47,780	55,542	738,353	92,050	537,367	628,450	608,925
Subtotal		1,822,496	1,504,253	2,382,340	641,422	1,848,484	2,140,763	2,132,878
INTENSIVE DEVELOPMENT								
Timber Production	(TP)	795,316	1,767,900	3,398,362	4,513,731	2,700,523	2,983,785	3,092,537
Total Moderate and Intensive Development		2,617,812	3,272,153	5,780,702	5,155,153	4,459,007	5,124,548	5,225,415
Total Remaining in Natural Setting		7,749,578	7,035,440	4,622,505	5,221,435	5,845,987	5,124,964	5,023,753

TABLE 3-70
ALLOCATION OF ROADLESS AREAS BY PRESCRIPTION GROUPING BY ALTERNATIVE

Alternatives	*Intensive Development*	*Moderate Development*	*Natural Setting*	*Recommended Wilderness*
A	795,320	1,822,500	5,834,310	7,404,240
B	1,767,900	1,504,260	6,977,190	5,607,030
C	3,298,360	2,382,340	4,568,640	5,607,030
D	4,513,730	641,420	5,094,190	5,607,030
E	2,700,520	1,848,490	3,903,120	7,404,240
F	2,983,790	2,140,770	5,124,790	5,607,030
G	3,092,540	2,132,880	5,023,920	5,607,030

EFFECTS OF ALTERNATIVES

In *Alternative A*, 1,818,213 roadless acres are recommended as Wilderness, resulting in 15 additional wildernesses and eight additions to existing Wildernesses. An additional 5,800,000 roadless acres are allocated to the natural setting prescriptions and would remain essentially in their natural condition; 1,800,000 roadless acres are allocated to the moderate development prescriptions where roads and other development may occur over time; and 800,000 roadless acres are allocated to intensive timber harvest. Most of the 536,000 acres of suitable forest land scheduled for harvest over 150 years in this alternative are within this latter group. This alternative directly affects these 536,000 acres, about five percent of the present unroaded area of the Forest.

Roadless areas may also lose their potential for future consideration as wilderness as a result of fragmentation by the 2,080 miles of new roads, and other development, where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative A affects the wilderness potential on 900,000 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative A has the least adverse effect on the roadless resource of any of the alternatives.

In *Alternative B*, 7,035,000 acres are allocated to the natural setting prescriptions, including 962,000 acres identified for protection from timber harvest in the original Southeast Conference recommendation; 1,500,000 acres are allocated to the moderate development prescriptions where roads and other development may occur; and 1,767,000 acres are allocated to prescriptions allowing intensive timber harvest. Most of the scheduled harvest of suitable forest lands and construction of 5,720 miles of new road construction would occur in this latter group. Planned entries of roadless lands in this alternative would harvest 1,101,000 acres of suitable forest lands over 150 years, or about 10 percent of the present roadless area of the Forest.

In this alternative additional roadless areas are fragmented or otherwise reduced to areas of less than 5,000 acres. Overall, Alternative B would eliminate the Wilderness potential on about 2,400,000 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades.

In *Alternative C*, 4,600,000 acres are allocated to the natural setting prescriptions, 2,380,000 acres are allocated to the moderate development prescriptions where roads and other developments may occur over time, and 3,398,000 acres are allocated to intensive timber harvest. The harvest of the 1,750,000 acres of suitable forest lands selected in the alternative, and construction of 6,290 miles of new roads, would occur primarily in this latter group over a 150 year period, and would directly affect about 17 percent of the roadless land base over fifty years. With the additional effect of fragmentation of roadless areas, the Wilderness potential on about 2,500,000 roadless acres would be lost. As with the other alternatives most of the effects occur during the first two decades.

In *Alternative D*, 5,220,000 acres are allocated to the natural setting prescriptions. Only 641,000 acres are in the moderate development prescriptions, but 4,500,000 acres are allocated to intensive timber management, with 7,410 miles of road constructed to access timber on 1,454,000 acres of suitable forest land over a 150 year period. This would directly affect about 14 percent of the roadless land base over 50 years. Considering additional effects of fragmenting large areas, this alternative could eliminate the Wilderness potential of about 3,100,000 acres. Alternative D has the greatest reduction in the roadless area resource of the alternatives.

Alternative E recommends 1.8 million additional acres as Wilderness, permanently retaining the roadless character of about 17 percent of the present roadless area. An additional 4,000,000 acres are allocated to the natural setting prescriptions and generally would retain their roadless character; 1,848,000 acres are in the moderate development prescriptions in which roads and other development may occur, and 2,700,000 acres are allocated to the intensive timber management prescription. In this alternative, construction of 3,380 miles of roads to harvest the 1,077,000 acres of suitable forest land over a 150 year period directly affects about nine percent of the roadless area of the Forest. Considering the probable fragmentation of some roadless areas, approximately 1,810,000 roadless acres would be eliminated from future consideration for Wilderness.

Alternatives F and G are very similar in their effects forest-wide. They differ primarily in the location of specific areas to be protected from timber harvest. These alternatives allocate about 5,000,000 acres to the natural setting prescriptions and would generally retain the roadless character, although there are some differences in the location of the areas. About 2,200,000 acres are in the moderate development prescriptions in which roads and other development

may occur. About 3,000,000 acres are allocated to intensive development for timber harvest. In these alternatives, construction of about 5,400 miles of road to harvest the 1.2 million suitable acres in these alternatives over a 150 year period would directly affect about 11 percent of the roadless area of the Forest. The probable fragmentation of areas as a result of roads and harvest would eliminate the Wilderness potential on 2.5 million acres.

The effects of the alternatives on individual roadless areas are described in more detail in Appendix C. Effects on the H.R. 987 and Southeast Conference areas are generally described below.

Table 3-71 displays by alternative the allocation of the H.R. 987 areas proposed as wilderness. The intensive development and moderate development prescription groupings indicate a probability that these areas would be modified by Forest Plan implementation, and that they then may no longer meet the minimum criteria for consideration as wilderness. Alternatives A and E show all areas designated as wilderness. In Alternative B, about 23 percent of the areas is allocated to a moderate or intensive development prescription. Alternatives C and D have the greatest potential effects to H.R. 987 areas, with 63 and 66 percent of the areas subject to intensive or moderate development (in suitable forest lands). Alternatives F and G have 34 and 41 percent in moderate or intensive development.

TABLE 3-71
ALLOCATIONS OF H.R. 987 AREAS BY PRESCRIPTION GROUP BY ALTERNATIVE

Alternative	*Intensive Development*	*Moderate Development*	*Natural Setting*	*Recommended Wilderness*
A	0	0	0	1,820,000
B	232,000	169,000	1,418,000	0
C	606,000	540,000	672,000	0
D	138,000	62,000	618,000	0
E	0	0	0	1,820,000
F	322,000	296,000	1,200,000	0
G	435,000	304,000	1,079,000	0

Table 3-72 displays by alternative the allocations of the original Southeast Conference areas proposed for no timber harvest. The intensive and moderate development prescriptions groupings have a higher probaility that the area would be modified by Forest Plan implementation including timber harvest on suitable forest lands.

Alternatives A and E allocate all but 48,000 acres (seven percent) of the Southeast Conference areas to Wilderness, preserving their present undeveloped character. Alternatives B and F recognize the Southeast Conference proposals and manage all of the areas to retain their natural setting. Alternative C has the greatest potential to modify these areas through road construction and timber harvest, with 95 percent of the areas in the moderate and intensive development prescriptions. Alternative D has 61 percent of the areas in these prescriptions, and Alternative G has 18 percent.

TABLE 3-72
ALLOCATION OF ORIGINAL SOUTHEAST CONFERENCE AREAS BY PRESCRIPTION GROUPING BY ALTERNATIVE

Alternatives	*Intensive Development*	*Moderate Development*	*Natural Setting*	*Recommended Wilderness*
A	3,000	12,000	33,000	651,000
B	0	0	697,000	0
C	319,000	244,000	672,000	0
D	425,000	22,000	251,000	0
E	35,000	1,000	12,000	651,000
F	0	0	697,000	0
G	123,000	43,000	532,000	0

Table 3-73 displays the allocation of the revised Southeast Conference areas to prescription groupings by alternative. Alternatives A and E would manage 593,000 acres (88 percent of the area) as wilderness. Alternative G manages all of the areas in their natural settings and retains their current undeveloped character. Alternative B and F manages over 90 percent of the areas in a natural condition. Alternative C retains about one-third of the areas in a natural setting, and includes 69 percent in moderate and intensive development prescriptions. Alternative D retains about one-half of the areas in a natural setting, and includes 44 percent in moderate and intensive development. Alternative C has the greatest potential to modify the revised Southeast Conference areas.

TABLE 3-73
ALLOCATION OF REVISED SOUTHEAST CONFERENCE AREAS BY PRESCRIPTION GROUPING BY ALTERNATIVE

Alternatives	*Intensive Development*	*Moderate Development*	*Natural Setting*	*Recommended Wilderness*
A	5,000	17,000	48,000	593,000
B	4,000	23,000	636,000	0
C	207,000	251,000	206,000	0
D	325,000	21,000	327,000	0
E	36,000	15,000	20,000	593,000
F	10,000	49,000	604,000	0
G	0	0	663,000	0

SOILS

AFFECTED ENVIRONMENT

INTRODUCTION

Over 100 different kinds of soils have been identified in the Tongass National Forest, the largest forest in the National Forest system. Soils in Southeast Alaska develop in parent materials originating from a variety of geological or vegetative sources. (Parent material is the inorganic, or "mineral," earth, or organic matter, in which soils develop.) Parent materials include volcanic ash, glacial deposits, colluvium, stream and uplifted marine sediments, and deposits of decomposed plant materials. The glacial deposits, colluvium and sediments are derived from many different kinds of igneous, sedimentary and metamorphic rocks.

Soils are commonly divided on the basis of parent materials into mineral and organic soils. Both occur extensively in the Forest. Sixteen percent of the inventoried land area of the Tongass consists of ice, exposed bedrock, and bodies of water: the rest is either mineral or organic soil. These two categories are discussed below.

Mineral Soils. The mineral soils originate from deposits of glacial material, colluvium and residual materials from sedimentary, metamorphic, and igneous rock. Glacial materials are found in U-shaped glaciated valleys and lowland areas, and are extensive up to 1,500 feet in elevation. Parent material from postglacial ash and pumice are found extensively only on Kruzof, northern Baranof, and southern Chichagof Islands. Extensive areas of marine sediments are located on the northern half of the Forest, while small isolated terraces have been located up to elevations of 500 feet throughout other parts of the Forest.

Spodosols are the dominant mineral soils of the Forest. Spodosols are soils that have several layers (spodic horizons) in which iron, aluminum, and organic matter have accumulated. Mineral soils account for 7.87 million acres (62 percent) of the total area of soils mapped in the Forest. In some soil, thin cemented layers or underlying compact till restrict drainage, causing poorly drained soil conditions. Most mineral soils have thick surface organic horizons (mostly 4-10 inches thick), are acidic (pH 3.0-6.4), have weak structures, are wet or continually moist, and have low clay content. Soil depths range from less than 20 inches to 20 feet or more, and the soils range from well to very poorly drained. Due to thick organic surface layers, these soils have high infiltration rates. Surface runoff occurs only locally, or in barely definable ephemeral channels. These soils remain wet year-round.

Organic Soils. Composed of dead and decomposing plant parts, organic parent materials are generally found on poorly drained glacial materials and marine sediment deposits. The Forest's cool temperature and moist conditions prevent vegetation from decomposing quickly. This results in extensive organic material accumulation.

Organic soils, or Histisols, in the Southeast environment support either forest and/or herbaceous vegetation. Organic soils that support open areas of herbaceous vegetation are referred to as muskegs. Forested organic soils may be either well or poorly-to-well drained. Those that are poorly drained are sites of scrubby or reduced forest growth. Well drained organic soils support commercial forests of western hemlock, or western hemlock intermixed with cedars and Sitka spruce. Organic soils account for 2.87 million acres (22 percent) of the total area of the soils mapped on the Forest.

Organic soils are widely distributed throughout the Forest. They are found from alpine to sea level. They occur on hills, ridgetops, valley bottoms, mountain slopes with considerable gradient, and glacially-scoured benches and depressions on mountains and hills. They range from just 3 inches to well over 40 feet deep.

One of the most important characteristics of organic soils is their great capacity for taking up and holding water (organic soils act somewhat like a sponge). Because they are wet or saturated with water most of the year, these soils, except for the well drained ones, are poorly to very poorly drained. Muskegs contain surface water most of the year, while coniferous forests with poorly drained organic soils have water tables five to ten inches below the surface of the duff layer.

High water tables in poorly drained organic soils allow little storage capacity for additional water from either rain or snow. Consistently, most of the precipitation falling on muskegs rapidly runs off the surface, and only the amount needed to recharge the water table infiltrates the soil. The exception to this is during dry periods of two or more weeks. During these periods, water tables in all organic soils are lowered by subsurface drainage. Even though dry periods of four weeks or more may occur, the subsoils of these poorly drained soils never become dry.

Organic soils supporting coniferous forests have thick organic duff layers over bedrock or organic subsoils. Surface runoff does not occur on these soils, as it does in muskegs, because the organic duff surface is able to absorb all precipitation, and these organic soils are on landforms that allow better subsurface drainage than landforms associated with muskegs.

Soil Productivity

Soil is very important since it affects the productivity and quality of all other forest resources. Tree growth, wildlife and fish habitat, and recreation opportunities are associated with soil quality. Soil productivity presently receives the most interest and concern through the management of old and second-growth timber. In Southeast Alaska, productivity of mineral soils, in terms of tree growth, ranges from very high on floodplains, till plains, and most other lowlands, to progressively lower as latitude or elevation increase, and on more poorly drained soils. Productivity on poorly and very poorly drained organic soils, regardless of elevation or northern extent, is generally much lower than the productivity of mineral soils.

Soil, or site, productivity is generally measured by the rate of biomass accumulation. The measure for timber production might be cubic feet of bole wood or board-feet of lumber from an acre of land divided by the duration (years) of a rotation. Because forest production is very difficult to measure, site index is commonly used to give a relative indication of soil or site productivity. Site index is the tree height of dominant trees at a specified age. The site index tables or curves used in Southeast Alaska were developed from trees in even-age stands, but uneven-age or old-growth stands predominate in Southeast Alaska. Therefore, there are few satisfactory sites for determining site index (Stephens et al., 1968). Even-aged stands of natural regeneration in previously logged areas are just now beginning to produce potential site indices in second growth stands. In addition to site index, research scientists are studying the effect of tree spacing on stand productivity.

Soil productivity can be predicted reasonably well from soil type characteristics. Soil drainage and soil depth are responsible for the greatest difference in forest productivity in Southeast Alaska. Stephens, Gass, and Billings (1968) reported that for determining site index, timber-producing soils of Southeast Alaska could be grouped into seven categories based on soil drainage and soil depth. Ford, Farr, and Ping (1988) found that out of four soil characteristics only coarse fragment content was significantly related to site index for Sitka spruce. Cullen (1987) found that of eight soil and four landform characteristics used to predict timber volume, soil drainage class described the greatest difference in productivity, and soil depth described the second greatest difference. Although soil depth, coarse fragment content, and drainage reflect the influences of other site factors, these characteristics best relate to timber growth according to these studies. Table 3-74 shows the relationship of productivity to soil characteristics.

Soil Erosion Sedimentation Mass Movement

Soil erosion in the form of gullies, sheet, or rill erosion is very minor in soils under natural, undisturbed conditions. Under these conditions, the thick surface duff layers that cover the mineral soils protect soil from surface erosion. Mineral soils can be exposed either by natural causes, such as landslides, or management activities, such as timber harvest and road construction. Surface

erosion becomes active once the duff layer is removed and mineral soil exposed. Erosion will occur on exposed mineral soils until revegetation has occurred. Revegetation may be man-assisted (grass seeding and fertilization is usually required by road construction contracts) or natural. In either case, maximum sediment production occurs within the first five years after exposure, returning to background levels in approximately 10 years. Naturally occurring and land management initiated landslides (soil mass movement) dominate the erosion processes on steep forest lands in Southeast Alaska.

TABLE 3-74
SOIL CHARACTERISTICS RELATED TO SOIL PRODUCTIVITY-SITE INDEX

Soil Characteristics	*Productivity-Site Index*	
	Adjective	*Numerical*
Greater than 10 inches deep,[1] well & moderately well drained, nonskeletal.	High	>80[2]
2-10 inches deep[1] Well & moderately well drained, skeletal; somewhat poorly drained, non-skeletal & skeletal; poorly drained, skeletal.	Moderate	41-80
Less than 2 inches deep[1] well & moderately, drained, skeletal & non-skeletal.	Poor	<40
Poorly & very poorly drained any depth, non-skeletal.	Poor	<40

[1]Soil depth is measured from the surface of the mineral soil.
[2]Site index is based on 50 year-old stands.

The principal effects of landslides are on streams and on soil productivity. Although few in number, landslides entering streams deposit an initial large mass of sediment, and then provide a persistent source of stream sedimentation until the slide area revegetates (usually within five to ten years). Landslides deliver eroded material to streams more efficiently than surface erosion. Little is documented or understood about the total impact of sediment from eroded soils being routed through streams in Southeast Alaska and its persistence in them. Landslides seriously retard soil productivity for forest regeneration by first removing the soil mantle down to bedrock or to glacial till on upper slopes, and then depositing the debris over productive soils on lower slopes and valley bottoms (Harris 1967). It takes 50 to 100 years for the nitrogen and organic soil layers to be rebuilt.

A broad-level photo reconnaissance of landslides greater than 77 cubic meters in timber harvest areas occurring over the last 20 years (1963-83) in Southeast

Alaska, provides present preliminary Forest-wide data on landslide type, frequency, distribution, and general relations to harvest activities (Swanston, unpub. 1989). A total of 1,395 landslides were not identifiable on 1962 photos. Each of these landslides were assumed to have occurred within the 20 years since 1963, a period essentially covering the development of large-scale clearcutting in Southeast Alaska. Total landslide acreage accounts for less than one percent of the Tongass National Forest that was inventoried.

Of the total landslides, 118 (or about nine percent) occurred in clearcut areas or were directly associated with timber harvesting and 1,277 landslides (about 91 percent) occurred in unlogged areas. When compared on a per acre bases, landslides were approximately one per 2,240 acres on logged areas compared to one per 7,470 acres on unlogged areas. Landslides occurring on clearcut areas are about three times as frequent as those on unlogged areas. Although this threefold increase on logged areas seems large, it accounts for only 0.8 percent of the 500,000 acres logged on the Forest. The inventory data suggests that landslides are slightly more frequent on logged and unlogged areas on the northern Tongass than they are on the southern Tongass.

Landslides on unlogged areas appear to be larger and longer in those occurring in logged areas. Swanston's data indicates that 3.2 percent of the total landslides impact fish streams (0.5 percent are from logged areas and 2.7 percent are from unlogged areas). The total number of landslides impacting fish streams is very small. Of the 1,277 landslides occurring on unlogged areas, 37 (about three percent) impacted fish streams, while about six percent of the 118 landslides occurring on logged areas impacted fish streams.

SOILS

ENVIRONMENTAL CONSEQUENCES

Forest management activities can cause soil erosion and reduce productivity through exposure of the mineral soils. Road and log landing construction have the highest potential to affect soils in Southeast Alaska, whether in conjunction with timber harvest or other activities such as mining. The predominant effect on soils from construction and maintenance of roads is erosion from cut banks and road surfaces. Some portion of this eroded soil material is transported in the inside ditch to streams and becomes stream sediment. Loss of soil productivity is unavoidable, as roads are constructed over soil, thus taking land out of production.

Landslides caused by management activities can affect soil quality and quantity. Landslides move soil from steep upper slopes to lower slopes. Soil loss from the upper slopes diminishes productivity, and the exposed soils or landslide materials serve as sites of accelerated rill erosion, and may deliver large quantities of sediment to streams.

Due to the considerable amount of vegetative ground cover remaining after logging, erosion is usually negligible. Wind erosion is practically non-existent, while water-caused soil erosion is only present where management activities expose extensive areas of mineral soils. Soil erosion and loss of soil productivity are initiated primarily from timber harvest activities such as road and landing construction, occasionally from yarding activities, and on landslides resulting from these activities.

All of the alternatives require timber harvesting and road building, so some accelerated soil erosion will occur and soil productivity will be lost by covering soils with roads. Some of the accelerated soil erosion and lost productivity will be from landslides initiated by timber harvest and road management activities. Since there is a range of alternatives, each calling for the Forest to be managed in a different way, the different alternatives will generate differing levels of risk of soil erosion and lost soil productivity.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

There are no quantitative measurements of soil erosion, from either roads or landslides, for the Forest. The same is true for loss of soil productivity, or even measures of what constitutes adverse loss of productivity. Because of the lack of quantitative measurements, use of total area disturbance (in acres of projected timber harvest and acres of projected roads including road rights-of-way) is used to estimate the effects by alternative. The cumulative acres of roads by

TABLE 3-75
CUMULATIVE ACRES OF ROADS PER GEOZONE BY ALTERNATIVE FOR THE FIRST AND FIFTEENTH DECADE

Geozone[1]	Total Acres	Net Vegetated Acres	Alt A 1	Alt A 15	Alt B 1	Alt B 15	Alt C 1	Alt C 15	Alt D 1	Alt D 15	Alt E 1	Alt E 15	Alt F 1	Alt F 15	Alt G 1	Alt G 15
C01	176,137	115,678	0	0	27	108	0	0	0	0	0	0	0	0	0	0
C02	354,207	284,649	940	981	1,555	2,736	1,649	3,114	1,555	2,736	961	981	1,865	3,978	1,858	3,951
C04	41,029	32,712	121	141	168	330	209	492	182	384	128	141	209	492	209	492
C05	120,013	99,728	0	0	14	54	7	27	14	54	0	0	14	54	7	27
C06	372,719	296,168	790	817	1,451	3,139	1,134	1,924	1,303	2,599	790	817	1,161	1,978	1,168	2,032
C09	294,733	175,069	370	370	579	748	572	721	579	748	370	370	572	721	572	721
C10	431,918	321,666	568	568	1,297	1,756	1,216	1,432	1,216	1,432	568	568	1,216	1,432	1,216	1,432
C11	126,120	89,731	124	124	124	124	124	124	158	259	124	124	124	124	124	124
C18	217,530	136,552	233	273	523	1,434	267	408	429	1,056	219	219	348	732	348	732
C20	86,742	78,354	34	135	74	297	196	783	122	486	95	378	182	729	122	486
C21	182,721	124,841	15	35	298	1,169	103	386	116	440	8	8	103	386	96	359
C22	719,339	483,668	114	114	114	114	195	438	256	681	114	114	128	168	114	114
C23	1,970,942	785,554	0	0	263	1,053	0	0	27	108	0	0	0	0	0	0
C24	159,485	150,663	389	510	504	969	470	834	524	1,050	456	780	470	834	470	834
C25	240,716	220,876	53	87	431	1,707	722	2,868	431	1,707	53	87	580	2,301	695	2,760
K01	130,025	49,390	207	207	207	207	335	720	261	423	335	720	335	720	335	720
K04	491,445	453,464	1,907	1,907	3,750	9,278	1,907	1,907	2,447	4,067	1,907	1,907	1,907	1,907	1,907	1,907
K05	193,473	188,716	0	0	520	2,079	203	810	297	1,188	0	0	317	1,269	182	729
K06	709,615	673,594	7,410	10,940	8,234	13,640	8,247	13,856	9,098	15,908	7,741	12,938	8,045	13,910	7,991	13,613
K07	279,242	253,645	695	1,478	1,337	2,828	1,593	3,341	1,735	3,746	1,553	3,179	1,296	3,341	1,505	3,341
K08	399,683	355,481	1,704	2,507	2,655	4,289	2,885	5,639	2,480	4,964	2,365	3,992	3,114	5,342	2,959	5,342
K09	141,794	132,552	99	261	605	2,286	572	2,151	605	2,286	99	261	572	2,151	572	2,151
K10	102,921	100,460	0	0	135	378	419	1,431	311	999	7	0	68	243	47	162
K11	224,209	214,520	3,200	4,557	3,349	5,151	3,673	6,447	3,679	6,474	3,423	5,448	3,423	5,448	3,605	6,177
K13	151,185	151,185	85	85	85	85	85	85	85	85	85	85	85	85	85	85
S01	302,218	290,135	1,590	3,189	2,001	3,675	2,089	4,674	2,447	6,132	1,630	3,351	1,961	4,161	1,968	4,188
S02	124,065	119,588	0	0	135	486	452	1,107	689	1,998	0	0	405	918	405	918

[1]Geozones C03, C07, C11, C12, C13, C14, C15, C16, C17, K02, K12, K13, K14, K15, S10, S12, and S14.
Geozone K13 only accounts for the 151,185 acre roaded non-wilderness area of Misty Fiords Monument.

TABLE 3-75 (continued)

CUMULATIVE ACRES OF ROADS PER GEOZONE BY ALTERNATIVE FOR THE FIRST AND FIFTEENTH DECADE

		Net Vegetated	Alt A		Alt B		Alt C		Alt D		Alt E		Alt F		Alt G	
Geozone[1]	Total Acres	Acres	1	15	1	15	1	15	1	15	1	15	1	15	1	15
S03	314,024	308,351	886	1,008	880	981	1,102	1,872	1,669	4,140	880	981	880	981	880	981
S04	115,283	111,820	1,197	1,588	1,042	1,669	1,237	1,912	1,507	2,533	1,069	1,669	954	1,318	954	1,318
S05	117,584	116,185	1,037	1,489	1,017	1,489	1,050	1,543	1,071	1,597	1,050	1,543	1,050	1,543	1,050	1,543
S06	235,054	216,287	402	747	375	801	1,023	1,908	1,300	3,150	929	1,530	740	1,530	740	1,530
S07	119,543	115,883	544	828	531	774	591	1,017	834	1,989	470	531	470	531	470	531
S08	611,468	223,486	340	711	333	900	549	1,764	1,008	2,142	529	1,683	529	1,683	529	1,683
S09	764,566	463,583	142	432	115	459	466	1,863	790	2,160	547	1,647	412	1,647	412	1,647
S10	287,266	282,559	0	0	0	0	47	189	324	1,296	0	0	0	0	0	0
S14	44,043	42,559	198	306	327	468	340	495	293	441	198	306	333	441	333	441
TOTALS	14,857,734	11,945,264	25,394	36,395	35,055	67,661	35,729	68,282	39,842	81,458	28,703	46,358	33,868	63,098	33,928	63,071

[1]Geozones C03, C07, C11, C12, C13, C14, C15, C16, C17, K02, K12, K13, K14, K15, S10, S12, and S14.
Geozone K13 only accounts for the 151,185 acre roaded non-wilderness area of Misty Fiords Monument.

The total land subject to risk of erosion as of 1988 was 20,366 acres, or 0.17 percent of the vegetated land and 0.14 percent of the total land in the geozones. In the following general analysis only vegetated land will be considered, as this is where new road construction will occur. In the first decade, lands subject to erosion range from a low of 25,394 acres (0.21 percent) in Alternative A to a high of 39,842 acres (0.33 percent) in Alternative D. This is a difference of just 0.12 percent between the seven alternatives for the first decade. The other alternatives, ranked from low to high following Alternative A, are E (28,703 acres), F (33,868 acres), G (33,928 acres), B (35,055 acres) and C (35,729 acres).

By the fifteenth decade, land subject to erosion (cumulative roaded acres) ranges from a low of 36,395 acres (0.30 percent) in Alternative A to a high of 81,458 acres (0.68 percent) in Alternative D. This is a difference in risk of sedimentation of 0.38 percent between the alternatives. The other alternatives follow in roughly the same order as above.

Seven percent or more of the land in a roaded condition is considered to be a significant density of roads for land management. Seven percent of the total vegetated land is 836,168 acres. None of the alternatives come near this threshold even after 15 decades, and all are below one percent of total roaded acres.

Swanston (1989) indicated from an inventory of landslides that 118, or about nine percent, occurred in clearcut areas or were directly associated with timber harvesting activities. This equals approximately one landslide for every 2,240 acres that has been harvested. This approximation is used to project the potential number of landslides with relation to future timber harvesting. Since the actual location of timber harvest units is unknown, the projection is based on the average annual timber harvest for the first, second, first through the fifth, and the sixth through the tenth, decades. This information is presented in Table 3-76 by alternative.

From Swanston's study, it was found that about six percent of the landslides occurring in logged areas affected fish streams. Applying this figure to the expected number of slides for the alternatives (Table 3-76), the expected frequency of slides reaching fish streams can be calculated. For the first five decades, under Alternatives B, C, D, F and G, one landslide every 2½-3 years would reach a fish stream. For Alternative E, the expected occurrence would be every four years, and for Alternative A every seven years.

TABLE 3-76
AVERAGE ANNUAL TIMBER HARVEST ACRES AND ASSUMED AVERAGE NUMBER OF LANDSLIDES BY ALTERNATIVE.

Alt	*Unit of Measure*	*Average Annual Harvest Acres by Decade* 1	2	1-5	6-10
A	Acres	5,970	5,180	5,480	5,180
A	Number	2.6	2.3	2.4	2.3
B	Acres	12,170	11,670	13,260	12,090
B	Number	5.4	5.2	5.9	5.4
C	Acres	15,350	13,730	14,180	13,300
C	Number	6.9	6.1	6.3	5.9
D	Acres	18,540	15,650	15,110	15,830
D	Number	8.3	7.0	6.7	7.1
E	Acres	9,250	8,620	8,950	7,940
E	Number	4.1	3.8	4.0	3.5
F	Acres	13,370	12,570	13,310	12,030
F	Number	5.9	5.6	5.9	5.4
G	Acres	13,420	12,580	12,660	9,920
G	Number	6.0	5.6	5.6	4.4

Source: Revision FORPLAN Reports 3/90

The greatest risk of impacts from soil erosion and lost soil productivity will be in Alternative D. Alternative A would have the lowest risk. The other alternatives rated between these two alternatives in decreasing order from D as follows: C, F and B, G and E.

MITIGATION

Forest-wide standards and guidelines for the soils resource are used in all alternatives (see Appendix G). These are designed to reduce the effects of land-disturbing management activities on soil erosion and soil productivity. Best Management Practices (Appendix I) are also used for all activities with the potential to affect water quality.

SPECIAL AREAS

AFFECTED ENVIRONMENT

Special Areas are areas which contain unique features or values including archaeological, historical, Native American religious, scenic, geological, botanical, zoological, and paleontological. The objective of these Special Areas is to provide public use, enjoyment, and study, when the resource is appropriate for public use, and protection of the unique value is available. Special Areas differ from Research Natural Areas in that they promote public use rather than the singular goal of research.

Seven Special Areas (Mendenhall Glacier Geologic Area, Ward Lake Recreation Area, Walker Cove-Rudyard Bay Scenic Area, Admirality Lakes Recreation Area, New Eddystone Rock Geological Area, Hubbard Glacier Geological Area, Tracy Arm-Ford's Terror Scenic Area) and a portion of one National Historic Landmark (Fort Durham Historic Landmark) containing unique or rare values have been previously designated and are managed for those values.

Proposed Special Areas are selected by evaluating the unique characteristics of the resource, describing their present condition, and then determining long-term preservation goals in terms of size, quantity of surrounding natural areas, protection needs, and kinds of unique resource values contained within each proposed area.

Each area may require unique management direction that is determined through individualized study and planning to determine standards and guidelines for long-term protection. This direction includes the development of an inventory of identified Special Areas discussing their environmental and historical values, their interaction with adjacent management areas, and an identification of measures and priorities for their protection of unique values. A protective boundary around each identified area is established that is inclusive of all values to be protected.

Special Area designations will maintain natural to near-natural conditions in specific areas. Resources contained within these areas would not be available for development except for public use facilities necessary to protect the values of the area, or needed for interpretation and scientific study.

SPECIAL AREAS

ENVIRONMENTAL CONSEQUENCES

The establishment of Special Areas or National Landmarks could be limited by a perceived lack of interest from the public, or from delay in the development of establishment reports and specific management plans, or coordination with appropriate State and Federal agencies.

Current multiple-use activities could limit opportunities to maintain unique values and, therefore, limit the potential to allocate areas to special area status in the future. In some instances, disturbance from project activities and increased public use may degrade those values. A process to establish an inventory of potential Special Areas will be initiated through the Forest-wide standards and guidelines. At present, no new Special Areas are being proposed for the Tongass National Forest.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Existing Special Areas will be protected from the effects of adjacent management activities under all alternatives (see the Special Areas direction in Appendices F and G). No adverse effects on existing areas are anticipated.

The possible effects on potential Special Areas are difficult to quantify, and the differences between alternatives difficult to measure. The difference in effects depends on the kinds and amounts of activities allowed, and in particular on the intensity and amount of ground disturbing activities, but is related more to the relative *risk* of an impact occurring than to any actual predicted occurrence.

The land allocations of the Intensive Development prescription group (see the introduction of this chapter for a discussion of prescriptions groupings), the timber production and minerals prescriptions, are most likely to affect potential Special Areas. This could result from either the alteration of natural settings, or the constraints imposed upon future management options. In many instances, retention of a natural environment is crucial to imparting and protecting the values which qualify an area as a special area.

Land allocations of the Moderate Development prescription group are likely to have less effect on potential Special Areas through alteration of natural settings. Future management options will vary and are likely to include increased demand for scientific study and use for interpretation and public enjoyment.

The Natural Setting and Wilderness prescription groups have a low potential for affecting potential areas, since changes to the natural environment will be minimal.

The amount of potential risk, and the intensity of ground disturbance, are displayed by alternative in Tables 3-77 and 3-78.

TABLE 3-77
ACRES OF POTENTIAL RISK TO POTENTIAL SPECIAL AREAS

	Prescription Group			
Alternative	*Wilderness And Natural Setting*	*Moderate Development*	*Intensive Development*	*Total Acres Suitable For Timber Harvest*
A	13,613,000	2,292,000	1,097,000	536,000
B	12,964,000	1,776,000	2,262,000	1,101,000
C	10,575,000	2,428,000	3,999,000	1,750,000
D	11,144,000	518,000	5,340,000	1,454,000
E	11,693,000	1,945,000	3,364,000	717,000
F	11,109,000	2,214,000	3,679,000	1,111,000
G	11,013,000	2,197,000	3,792,000	1,112,000

TABLE 3-78
AMOUNT OF GROUND DISTURBING ACTIVITIES PER YEAR (1ST DECADE)

Alternatives	*Road Construction (Miles)*	*Timber Harvest (Acres)*
A	80	5,970
B	223	12,170
C	234	15,350
D	293	18,540
E	129	9,250
F	205	13,370
G	206	13,420

Alternative A land allocations involve low to moderate alteration of the landscape, and represent a reduced level of ground disturbance from the current situation. The corresponding effects on potential Special Areas are expected to be low to moderate. Inventory and protection opportunities may be increased as compared to other alternatives.

Alternative B land allocations involve moderate alteration of the landscape, and represent a moderate level of ground disturbance from the current situation. The corresponding effects on potential Special Areas are expected to be moderate. Inventory and protection opportunities may be slightly increased as compared to Alternatives C and D.

Alternative C land allocations involve maintaining current direction and program activities. Little change is expected in timber harvest levels, road construction activities or other commodity-oriented projects which represent a moderate to high potential to affect the unique values of potential Special Areas. Conflicts between potential Special Areas and other resource management activities are likely with a corresponding loss of significant unique values and future management opportunities.

Alternative D land allocations involve increased levels of timber harvest and road building activities which represents a moderate to high potential to affect the unique values of potential Special Areas. Conflicts between potential Special Areas and other resource management activities are likely with a corresponding loss of significant unique values and future management opportunities.

Alternative E land allocations provide for a decrease in allowable sale quantity, road construction activities and other commodity-oriented projects which represent a moderate to high potential to affect the unique values of potential Special Areas. Conflicts between potential Special Areas and other resource management activities are likely with a corresponding loss of significant unique values and future management opportunities.

Alternative F and G land allocations involve little change from the current allowable sale quantity, road construction activities and other commodity-oriented projects which represent a moderate to high potential to affect the unique values of potential Special Areas. Conflicts between potential Special Areas and other resource management activities are likely with a corresponding loss of significant unique values and future management opportunities.

SUBSISTENCE

AFFECTED ENVIRONMENT

There are a variety of legal, cultural, popular, and social scientific definitions and interpretations of subsistence. Although there is a lack of consensus on a definition of subsistence, subsistence lifestyles are generally associated with small, self-sufficient, dispersed societies that have limited impacts on their environments. Traditional subsistence activities are usually relatively self-contained within a kinship, tribal, or community group, or within a geographic region.

Subsistence continues to play a critically important role for many households and communities in Southeast Alaska. With the exception of government, the socioeconomic environment of Southeast Alaska has been dominated historically by resource-related industries, including mining, commercial fishing, timber development, and, most recently, tourism. Due to the biophysical conditions of Southeast Alaska, employment in resource-related industries is highly seasonal. Salmon return to spawn in the late spring, summer, and early fall. Snow and darkness prohibit much work in mining and timber harvest during the winter months. The tourism season coincides with the summer months, generally running from May through early September.

Resource-related industries are also heavily dependent on (increasingly global) market cycles. When prices are relatively high for wood products, for example, higher levels of employment usually result. During recessionary periods, however, Southeast Alaskans working in resource industries often experience higher levels of unemployment than the national average.

Within this context of seasonal and cyclical employment, harvest of fish and wildlife resources takes on special importance. Use of these resources may play a major role in supplementing cash incomes during periods when the opportunity to participate in the wage economy is either marginal or nonexistent. Due to the high price of commercial products provided through the retail sector of the cash economy, the economic role of locally-available fish and game takes on added importance.

In addition to the economic importance of renewable natural resources to rural households, the opportunity to procure wild, renewable resources reinforces a variety of cultural and subcultural values in both Native and non-Native communities (Glass, Muth, and Flewelling, in press; Muth and Glass, 1989). For example, distribution of fish and wildlife contributes to the cohesion of kinship groups and to community stability through sharing of resources derived through harvest activities. Subsistence resources provide the foundation for

Native culture--ranging from the totemic basis of clan divisions, to norms governing the distribution of wealth in potlatch ceremonies, to reinforcement of basic values of respect for the earth and its resources. Harvest of fish and game plays important sociocultural roles in non-Native communities as well, among other things, it contributes to the self-reliance, independence, and ability to provide for oneself--values that social surveys indicate are important reasons why many non-Native people emigrate to or remain in Southeast Alaska (Alves, 1979).

To provide a single definition of subsistence which can convey all views is difficult. While many different meanings of subsistence exist, a legal definition is provided in Section VIII of the Alaska National Interest Lands Conservation Act (ANILCA) (P.L. 96-487). Section 803 of the Law defines **"subsistence use"** as **"the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."**

Roles and Responsibilities

Both the State of Alaska and the Forest Service play key roles in providing the natural resources which offer subsistence opportunities on the Tongass National Forest. The state is responsible for managing the populations of fish and wildlife resources of Alaska including the regulation of harvest. It is the responsibility of the Forest Service to manage the fish and wildlife habitat on National Forest lands. Summarized State and Forest Service responsibilities are (FSH 2609.25-Subsistence Management and Use Handbook):

State of Alaska:

1) defining which uses are traditional and customary for fish and wildlife resources,
2) defining which fish and wildlife species are subsistence species,
3) defining which communities are rural and which communities have traditional and customary uses of individual species,
4) allocating harvest levels of fish and wildlife resources between subsistence users and non-subsistence users, and
5) obtaining necessary information on subsistence resource uses to accomplish its responsibilities.

U.S. Forest Service:

1) management of habitat; providing habitat for fish, wildlife and other subsistence resources used on National Forest lands,
2) maintaining and managing for access opportunities,
3) evaluating all activities for their effect on subsistence uses and opportunities as mandated in Section 810 of ANILCA, and

4) obtaining necessary information on subsistence resource uses to accomplish its responsibilities.

The Forest Service has treated subsistence as an activity and not a resource in its management of the National Forest. This type of management can be compared to that of management for sport and commercial uses of the resources. Protection of and access to subsistence resources such as salmon, deer, moose and other species and traditional gatherings has been attained by the maintenance of habitat for each of the species. All management area prescriptions for the Tongass Land Management Plan Revision provide for the protection of and access to resource habitat.

Draft and Final Environmental Impact Statements for the Tongass Land Management Plan Revision will provide the avenue of documenting how subsistence considerations were incorporated in the decision-making process. Although not required, an ANILCA, Section 810 evaluation was performed for the Tongass Revision. This evaluation has been conducted to ensure consideration of subsistence effects in the Revision process. The evaluation found in this section of the Revision DEIS consists of:

1. *Evaluation* - (consisting of three parts)
   a. determining the effect of the proposed action on subsistence,
   b. determining the availability of other lands for the proposed action, and
   c. analyzing other alternatives which reduce or eliminate the proposed action from lands needed for subsistence.
2. *Finding* - Determining whether or not a proposed action may have a significant restriction on subsistence uses.
3. *Notice and Hearing* - If an action is expected to have a significant possibility of a significant restriction on subsistence uses, public notice is to be made with hearings in the affected areas.
4. *Determination* - (consisting of three parts)
   a. the subsistence restriction is necessary, consistent with sound management principles for the utilization of the public lands,
   b. minimum public lands necessary will be used to accomplish the purpose of the proposed action, and
   c. reasonable steps will be taken to minimize adverse impacts upon subsistence uses.

Legislative History

The Alaska Supreme Court, in its December 22, 1989, decision in *McDowell v. State of Alaska* found the state subsistence law unconstitutional. The court's decision placed the state out of compliance with ANILCA, Title VIII, staying the effect of the court's decision until July 1, 1990. In accordance with ANILCA, the

Federal government will have to assume management responsibility of subsistence on public (Federal) lands in Alaska starting July 1, 1990, unless the State comes into compliance by then or the stay of the court's decision is extended.

Chronology of events leading to *McDowell v. State* (Subsistence Brief, Federal Interagency Subsistence Management Program; Region 10, Subsistence Management, April 12, 1990):

1960 - The Federal government transferred authority for management of fish and game in Alaska to the new State government.

1971 - The Alaska Native Claims Settlement Act (ANCSA) extinguished aboriginal hunting and fishing rights. No law was enacted on protection of subsistence, but the Conference Report stated Native subsistence and subsistence lands would be protected by the State of Alaska and Department of Interior.

1978 - The State subsistence law created a priority for subsistence over all other fish and game uses. It did not define subsistence users (e.g., as "rural residents," "Natives," or other).

1980 - The Alaska National Interest Lands Conservation Act (ANILCA) required a subsistence priority for "rural residents" on Federal "public lands." It also said the State of Alaska could manage fish and game on all lands if it enacted a law granting a subsistence priority to rural residents, in compliance with ANILCA.

1982 - The Federal government said the State was in compliance with ANILCA, after the Boards of Fisheries and Game adopted regulations creating a rural subsistence priority.

1982 - Ballot Proposition 7 to repeal the State's subsistence priority was rejected by voters.

1985 - The *Madison v. State* decision was issued by the State Supreme Court which ruled that the 1978 State law did not specifically allow the Boards to grant a subsistence priority to rural residents.

1986 - The State subsistence law (1978) was amended by the Legislature to give a specific subsistence priority to rural residents.

1989 - The *Kenaitze v. State* decision was issued by the Federal appeals court which said the State's definition of "rural" (the economic nature of the community) was not consistent with that of ANILCA (the population of the community).

1989 - *McDowell v. State Decision* issued by the State Supreme Court on December 22, 1989 ruled that the State law (1978, amended in 1986) granting

a subsistence priority based solely on residency is unconstitutional under the Alaska State Constitution.

The impact of this decision is: State law is now out of compliance with ANILCA. As a result of the State Supreme Court's stay, the former rules remain in effect until July 1, 1990. After that, if there is no state and/or federal solution, "dual management" will occur: the federal government (U.S. Departments of Interior and Agriculture) will take over management of fish and game on respective "public lands" (more than 60 percent of lands in Alaska), while the State will retain management on state and private lands (including Native corporation lands). Overall, there are four possible choices to respond to the Court decision: to amend the State Constitution, to amend ANILCA, to amend both the State Constitution and ANILCA, or to do nothing.

At present, the Secretary of the Interior has given the U.S. Fish and Wildlife Service lead responsibility to prepare a Subsistence Management Contingency plan. The Fish and Wildlife Service has established an Alaska Subsistence Planning Team consisting of the regional directors of the four land managing agencies (U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and the Department of Agriculture-Forest Service) and the Bureau of Indian Affairs. This policy group, in turn, has established a Subsistence Work Group comprised of the representatives from all Federal land managing agencies including representatives from U.S. Air Force and Army and the National Marine Fisheries Service. The work group's charter is to prepare the contingency plan, interim regulations published in the Federal Register by July 1, 1990 and to initiate planning for permanent regulations. The mandates in Federal regulation preparation include:

(1) Maintain healthy fish and wildlife populations.
(2) Define subsistence use for rural Alaska residents to include use of resources for personal consumption, for handicrafts made of byproducts of those resources, and for customary trade.
(3) Provide for non-wasteful uses as priority use.
(4) Provide reasonable access for subsistence users.
(5) Provide a system of regional participation.

In Washington, D.C., a Subsistence Policy Group has been established under the leadership of the Department of the Interior, Solicitor's Office to provide guidance and review.

The 1990 situation is substantially different than the situation in 1986. Various court actions have greatly influenced regulations since 1986 and the likelihood of a Federal takeover appears to be much greater. Legislative action by the State in 1986 could clearly have brought the State back into compliance with ANILCA. An amendment to the State constitution is now believed by many policymakers, managers, legislators, and legal experts to be the only State

action which will produce a long-term solution to the State's current constitutional conflict with ANILCA.

If the State Legislature passed a constitutional amendment immediately by a two-thirds majority of both houses, it would be November 1990 before an amendment could be ratified by the State's residents. The court stay of the *McDowell* decision, which is currently the only barrier between continued State management and an immediate required Federal takeover, expires on June 30, 1990. Regardless of State action, a Federal takeover appears imminent, unless the current stay is extended. The court has indicated it does not intend to extend the stay.

The State's Congressional Delegation has strongly encouraged the State to resolve the subsistence issue and to not look at amending ANILCA as a solution. They believe any amendment to ANILCA will remove the issue from state control to a national audience, having potentially negative consequences for the State. Statements from various State legislators indicate a wide split over the Governor's proposal to amend the Constitution. A majority vote by the electorate is required for the amendment to become effective. It is uncertain if the electorate will ratify the amendment.

At the close of the 1990 Alaska Congressional Session, no decision had been made to bring State subsistence laws into compliance with ANILCA. A special session has been mentioned to address the situation, but at this time is not scheduled (Juneau Empire, May 9, 1990).

It appears that on July 1, 1990, the federal government (Secretaries of the Interior and Agriculture) will be required to assume management of fish and wildlife on public lands in accordance with ANILCA Title VIII, unless directed otherwise by the courts.

Native Cultural Ties

Thousands of years ago, Alaska was settled by people seeking the most abundant fish and wildlife resources. Villages and camps were established where access to these wild resources was dependable and convenient. Until relatively modern times, most of the necessities of life came from the land and its natural products, or from trade with adjacent neighbors. The rules governing life among villagers were derived from a combination of cultural, traditional, and spiritual beliefs, which developed over long periods of time (ADF&G, Historic Methods for Harvesting Non-Commercial Salmon in Southeast Alaska, February 1989).

The introduction of cash by Russian traders beginning in the 1700's signaled change in the subsistence way of life. Cash transactions allowed the Native Alaskans to take advantage of technology and provide a buffer against periods of low food supply. It was following World War II, and more precisely at the

time of statehood around 1959, that jobs opened up and many rural Alaskans began to experience a cash economy. In 1987, almost thirty years later, many subsistence users earn wages during part of or throughout the year.

Legal challenges, increased competition from other users of the National Forests, introduction of other cultures and races into the one-time predominantly Native societies, and alternative food sources as well as transportation and jobs have prompted the Native residents of Southeast Alaska to become active in the protection of the subsistence rights of Alaskan Natives. The Native Alaskan population represents 23 percent of the population of Southeast's 31 rural communities (Figure 3-33, Native/Non-Native Composites of Rural Southeast Communities). The importance of subsistence rights is a paramount concern to this segment of the region. "Survival of the hunting and fishing rights is the most vital link to the survival of the State's Native people and their cultures (Mallot, 1989)".

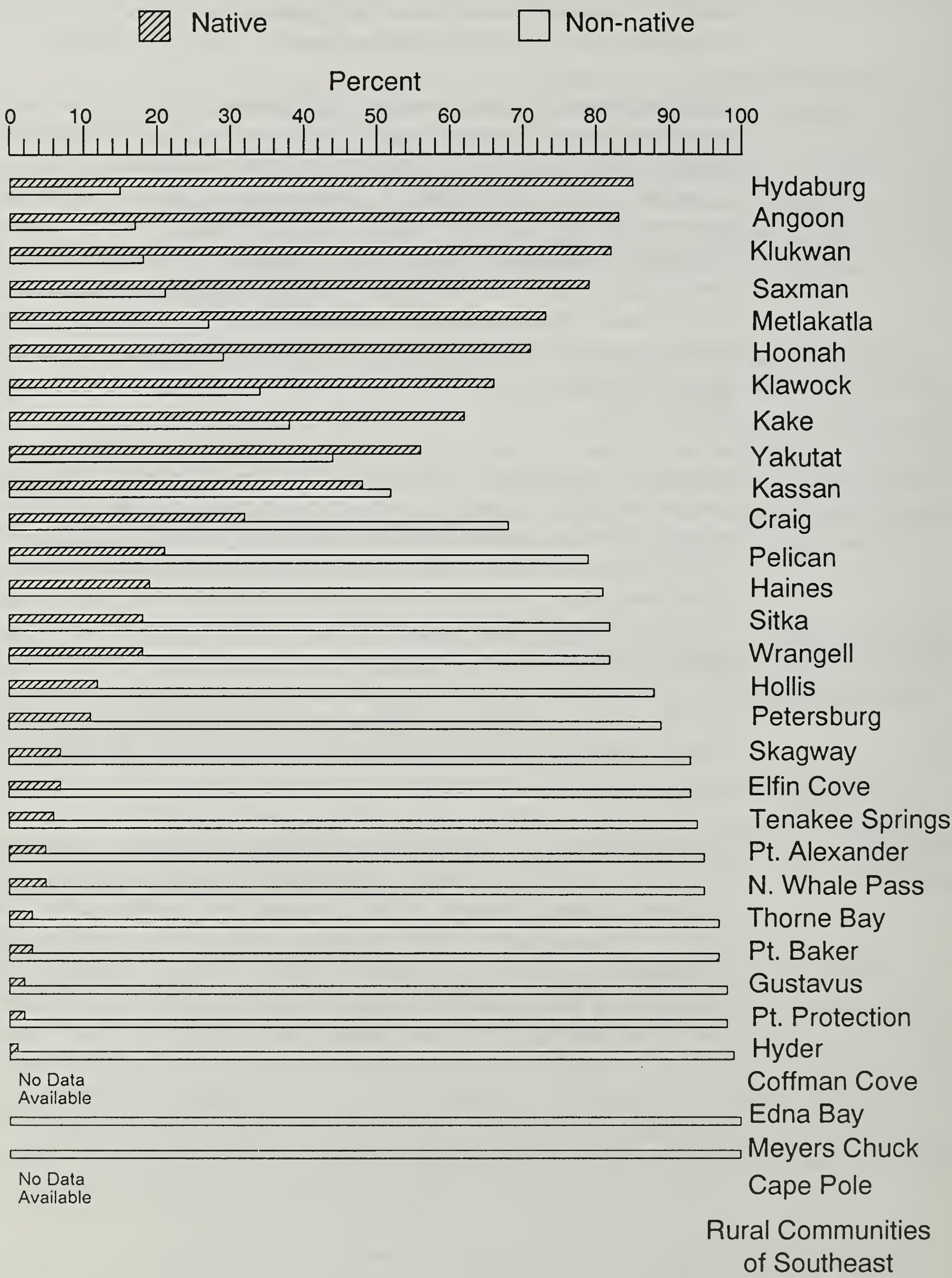
Decreased dependency on the natural resources in the areas where Native peoples and cultures live has been a common problem in the continuance of Native cultures. As with the American Indians of the lower forty-eight, a close bond between the natural resources of the land and the cultural commitments of the people has provided a continuance of the culture. With the advent of alternative food sources, transportation, education, etc., the tie to the land has been gradually decreased, threatening the future existence of the Native cultures. Now in Southeast Alaska, with legislation, court proceedings, alternative supply sources, the Alaska Native is suffering the same loss of bonding to the land. In order to preserve the tie and the dependency to the land, the demand of the right to subsist is paramount to the Native leaders of the Southeast communities.

Native Clan Boundaries

According to Oberg (1973) and others, the basis for property ownership among the Indians of Southeast Alaska was the local clan division. Clan property often consisted of salmon streams, hunting grounds, berry patches, sealing rocks, trapping areas, and other resource hunting and gathering locations. Clan membership, determined by family (matrilineal) descent, established the relationship of an individual to clan property held in common. As Krieger (1927) has observed, the entire territory adjacent to Native communities in Southeast Alaska was portioned out among the resident families or households as hunting, fishing, and berrying grounds. These lands were generally passed down from generation to generation, and the privilege to hunt, fish, or to gather berries belonged only to those individuals having ownership rights under Native law. Permission from the clan exercising property ownership was necessary before members from other clans could legally use the land.

FIGURE 3-33

NATIVE/NON-NATIVE COMPOSITES OF RURAL SOUTHEAST COMMUNITIES



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

Beginning in the late 1800's, non-Native migration and institutional development in Southeast Alaska resulted in population increases, establishment of new communities and expansion of existing ones, and boom-and-bust economic cycles based on a variety of resource-extraction activities (Muth, 1989). Clan boundaries and Indian property rights, as well as most other elements of Native culture, were foreign to the culture of the non-Native settlers increasingly populating Southeast Alaska. Writing about the development of the commercial salmon industry in Southeast Alaska in the 1890's and the early twentieth century, Drucker (1965) has noted,

> A prospective cannery operator would stake off and post his 160 acres . . . 80 on either side of the river mouth, and record this claim in the land office. And on that basis, he prohibited as trespass entry of any other person who wanted to fish the stream. Then he built his cannery and went into production. When his cannery floor was full of fish, if he wished to allow some Indians to fish the stream, he might do so; if not, he drove them off. (p.214.)

In addition to salmon fishing rights, other resource uses were affected. Drucker states:

> Hunting and trapping activities, both economically important to the Indians, likewise were curtailed by the rapid and extensive spread of squatter's claims. Even berry picking was affected.

New settlers, who competed for fish and wildlife resources both for household consumption as well as for sale in the cash economy, were often unaware of or disregarded the Native culture's traditional clan boundaries. They used whatever lands were available, and competition for resources rose dramatically. However, Native customs and laws continued to govern the landownership and use patterns of the indigenous peoples of Southeast Alaska.

According to Goldschmitt and Haas:

> The Natives had a well-defined system of property ownership which was not unlike our own, except that the land was generally held in the name of a clan or house group, with joint usage by such an extended family. Title to land was obtained by inheritance or as legal settlement for damages; it was never bought or sold. It was recorded in the minds of all interested parties by elaborate ceremonials and the distribution of goods among the people (potlatches), which were necessary before land ownership could be recognized. Deeds were sometimes further recorded in the carvings of the famous totem poles (p. iv.).

An important source of information for understanding historical boundaries demarking areas owned and used by different clans is provided in the work of Goldschmitt and Haas (1946). During an intensive period of field investigation, they interviewed Native residents of 12 communities in Southeast Alaska. The purpose of their mission was to identify ". . . what lands the natives of southeastern Alaska now have in their possession in actual use and occupancy which they similarly possess or claimed in 1884." Based on the interviews, and from information contained in secondary ethnographic and historical sources, they were able to reconstruct clan boundaries as they were determined to exist in 1946.

Inspection of the maps developed by Goldschmitt and Haas give a good indication of the land-use patterns associated with the Native communities that existed in the mid-twentieth century in Southeast Alaska. It is interesting to compare the maps developed by Goldschmitt and Haas with the resource-use area maps that were developed as part of the Tongass Resource Use Cooperative Survey (TRUCS) project in 1987. It is important to note that the Goldschmitt and Haas maps were the products of detailed ethnographic interviews, while the TRUCS maps were produced by interviewing a random sample of community residents. These methodological differences notwithstanding, the maps are roughly comparable. Areas used by certain clans in earlier times are still used today. As public scoping from the Native communities has told us, this suggests that norms of clan ownership and use are still operative. This pattern is further validated by comparing the TRUCS resource-use area maps (which at present should be considered drafts) for Native communities and non-Native communities. Despite the introduction of technological innovations (such as large, modern boats) that would allow residents of Native communities to range much greater distances than in earlier periods, their use is still confined to locations generally conforming to traditional clan landownership boundaries. The distribution of harvest locations for non-Native communities, on the other hand, is often apt to range over greater areas.

Clan landownership boundaries and use patterns have important implications for present day land management and resource allocation. The hunting and fishing behavior of non-Natives is governed by non-Native rules, such as distinctions between public and private property, boundaries between State Game Management Units, and harvest seasons that determine the locations in which fish and game can be taken.

Information from the TRUCS study and from village scoping sessions indicate that the hunting and fishing use by Natives in Southeast Alaska is still governed to some extent by traditional Native laws which define who may hunt and fish on which lands. Native leaders have expressed the need that the legitimacy of these boundaries be recognized in providing the subsistence needs of Southeast Alaska's Native villages. Resource allocation and land management activities

must be sensitive to traditional clan boundaries to ensure the availability of resources for all Native groups. For example, if the traditional subsistence hunting areas of one clan are prescribed for other uses (such as recreation development and timber harvest), then the clan potentially impacted by the decision is left with little choice but to either give up subsistence harvest or encroach on the traditional use areas of other clans. Through time, the inviolability of clan-related land use customs will be lost--increasing inter-group conflicts and further eroding the basis of Native culture in Southeast Alaska.

Current Situation

Who Subsistence Users Are

Southeast Alaska has a population of slightly less than 65,000 people. Most of this population is located in 33 established communities, with Juneau and Ketchikan accounting for approximately 60 percent of the Regional population. Juneau and Ketchikan, the only two designated urban communities in Southeast, do not qualify for subsistence use under current laws and regulations. Sitka, Petersburg, and Wrangell account for 22 percent of the Regional total. Most of the remaining 18 percent of the Regional population live in the other 28 small, but important, communities (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

In addition to permanent communities, logging and mining camps are located at sites of resource extraction and fish processing. Some of these camps such as Eight Fathom Bight near Hoonah on north Chichagof Island, Cube Cove on north Admiralty Island, Hobart Bay on the mainland north of Frederick Sound, Laboucher Bay on North Prince of Wales, an numerous floating and land-based logging camps at other locations on the Tongass National Forest, are large enough and have existed long enough to have a significant effect on local uses of fish and wildlife. Mining activities at Greens Creek on north Admiralty, Berner's Bay and Misty Fiords National Monument introduce sizeable numbers of people into those rural areas. While information about the location, number of residents, and potential use of natural resources of the larger, less transient camps, is available in many cases, no complete listing of temporary camps and their populations exists. Because camps come and go with contract timber sales and economic conditions, it is difficult and likely not reasonable to try to maintain up-to-date records of camp populations. Camp residents appear to be split between Alaska residents and residents of other states who leave Alaska when the working season is over for the year (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

A relatively small number of other Southeast residents live at remote isolated locations. These include people living at homesites throughout Southeast, at summer fishing sites along the outer coast, tree thinners camped near areas

where they have Forest Service contracts, trappers, people living on floathouses in the southern part of the Alexander Archipelago, and people living on fishing boats. This diverse group of transients generally has very low cash income and is closely tied to non-commercial harvest of fish and game, and other renewable natural resources.

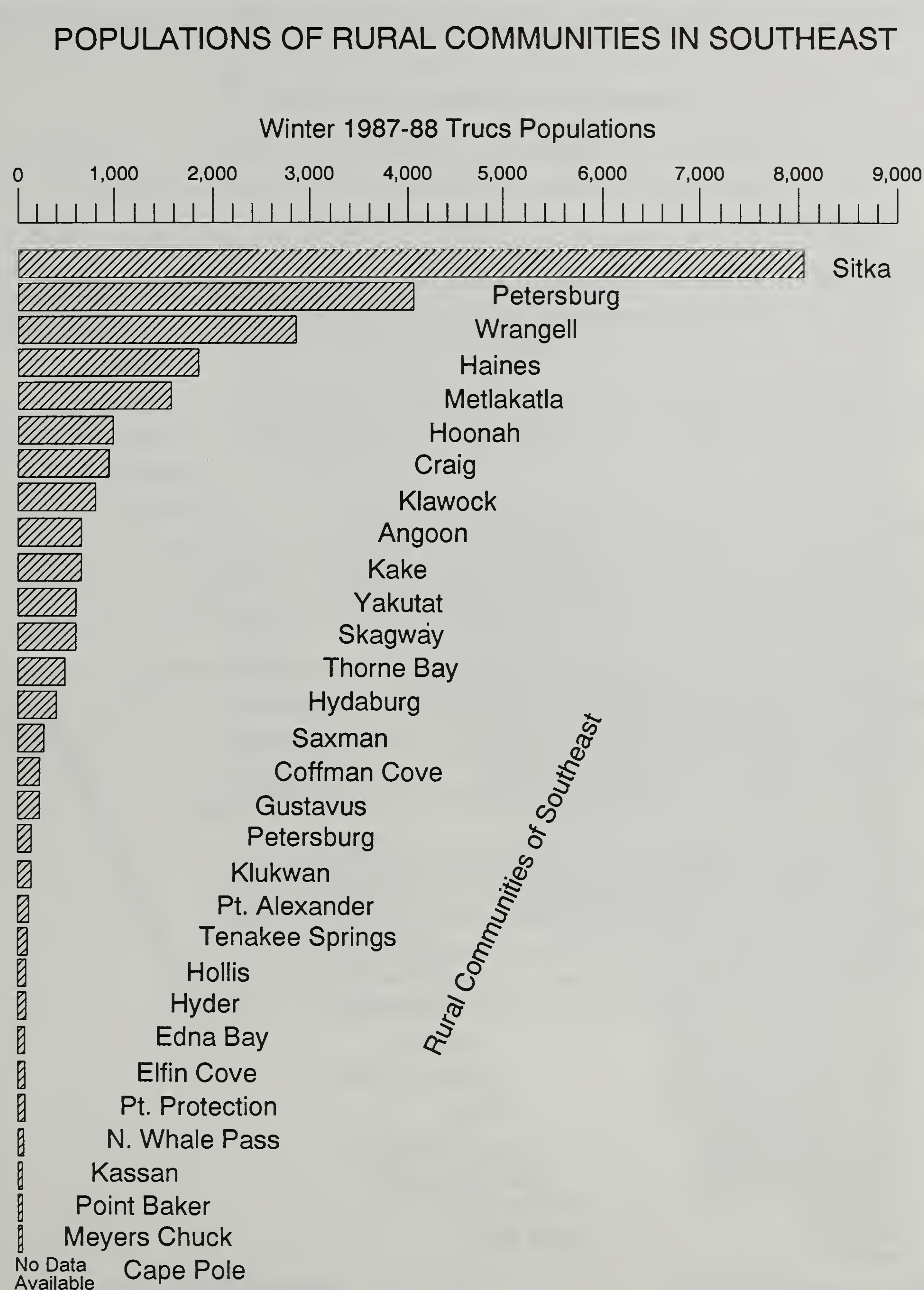
As in other parts of Alaska, Southeast's population grew with the expansion of government services following the oil boom. In recent years, however, the population has stabilized. A number of new communities, however, are in the process of becoming established either around state land selections or timber harvesting activities. Edna Bay, Coffman Cove, North Whale Pass, Thorne Bay and other small Prince of Wales Island communities are examples.

Of the 25,500 people living in the rural communities of Southeast Alaska, seven percent (1,572 people) live in the 17 small communities that had under 100 occupied households in the winter of 1988. About half the communities of rural Southeast Alaska account for less than 10 percent of the rural population. A third (9,000 people) of all rural residents live in the 11 communities of between 100 and 999 occupied households, and another quarter (6,875 people) live in Wrangell and Petersburg, each having approximately 1,000 households. Finally, one in three rural residents live in Sitka (Kruse, 1989).

Figure 3-34, Populations of Rural Communities of Southeast Alaska, identifies the rural communities of Southeast Alaska. All have subsistence rights as defined by the rural designation developed by the State of Alaska. All communities with the exception of Juneau and Ketchikan are included in the rural community designation. Juneau and Ketchikan are designated as non-rural developments.

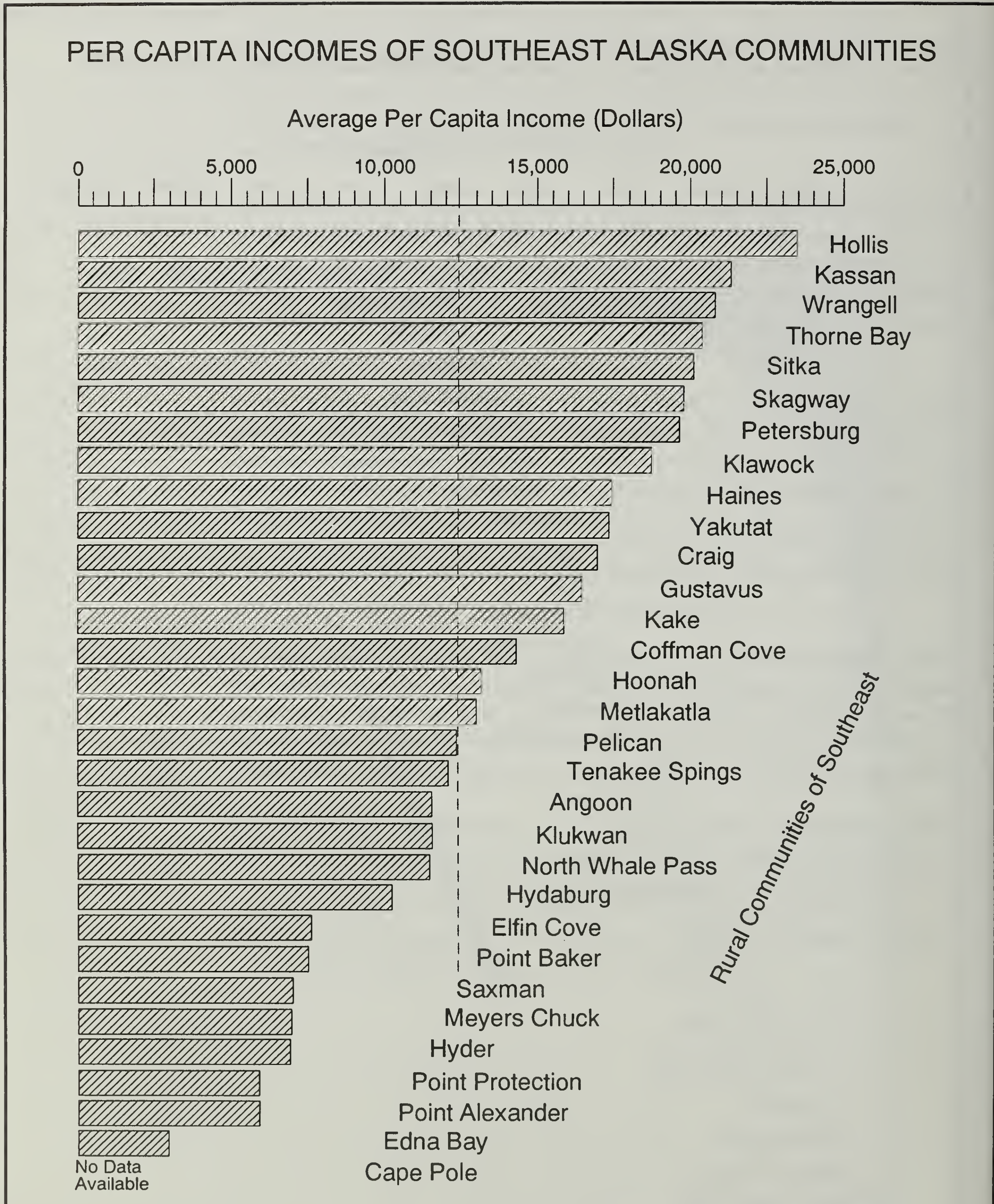
The median 1987 family income in rural Southeast Alaska was $37,500 (Figure 3-35, Per Capita Incomes of Southeast Alaska Communities). This can be compared with a U.S. median family income in 1987 of $30,853 (USDC 1988). In addition to the income generated by Southeast's rural residents are the substantial public services that are subsidized through government programs or provided by Native Corporations (Kruse, 1989).

FIGURE 3-34



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

FIGURE 3-35



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

Viewed from another perspective, however, incomes of Southeast Alaskan residents living in rural communities appear relatively low. The 1987 mean per capita income for Alaskans was $18,230 (USDC, Bureau of Economic Analysis, 1988). The comparable figure for Southeast Alaska was $12,000. In 1987, the members of one in six rural Southeast households had per capita incomes of less than $5,000. Thus, in 1987, the maximum income for households in this category with four members was $20,000 (Kruse, 1989).

Only 15 percent of rural Southeast households harvest no subsistence food. In 1987, half of all households (51 percent) report harvesting more than 80 pounds of edible subsistence product per capita. A quarter of all households harvest more than 250 pounds per capita (Kruse, 1989).

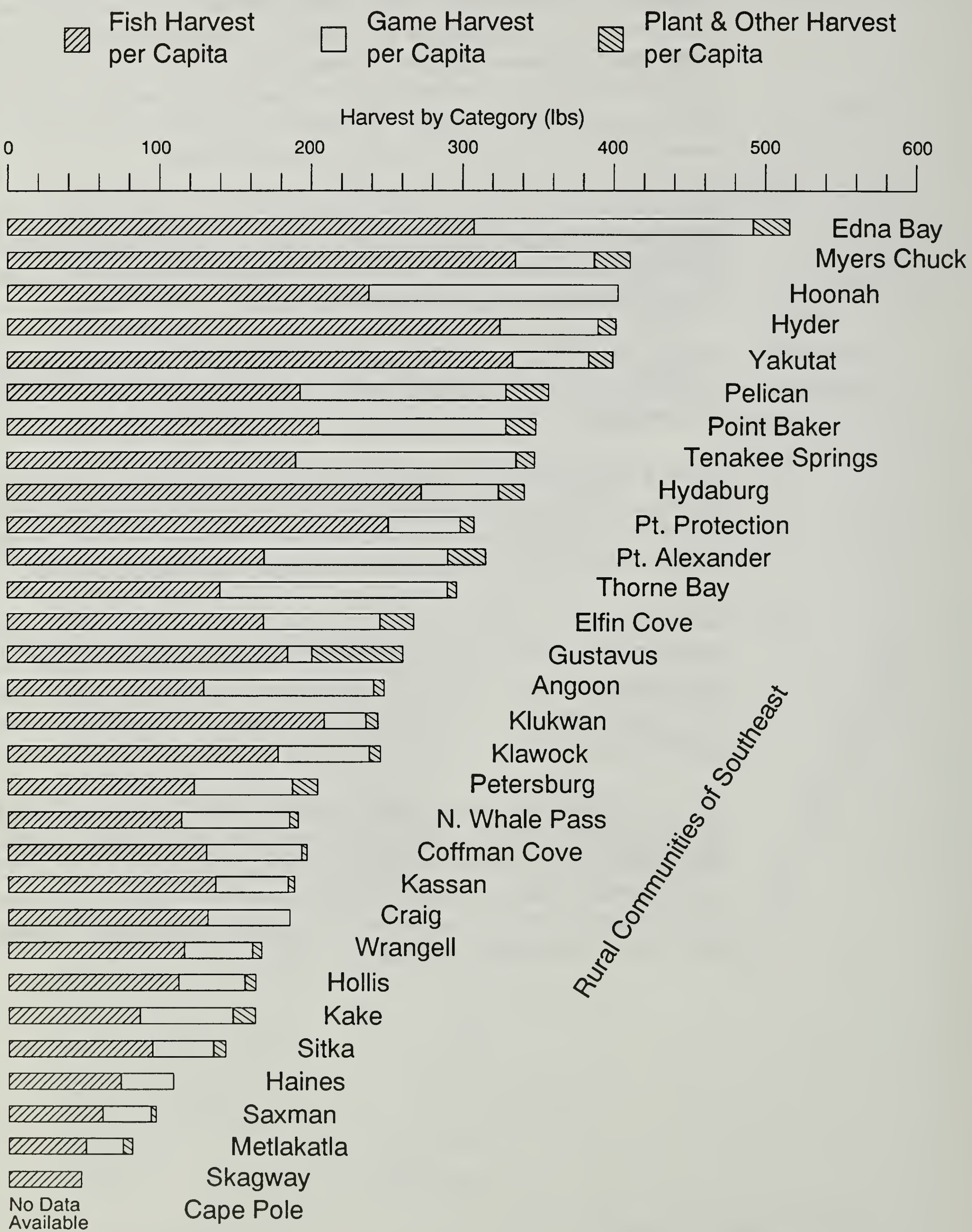
Figure 3-36, Per Capita Fish and Game Harvest of Rural Southeast Communities, identifies individual communities harvest of subsistence resources in terms of fish and game.

Much of the subsistence harvest is directly incorporated into household diets. Almost one in three households obtain at least half of the food they eat from their own harvest activities. About 40 percent of all households get at least 25 percent of their food from household subsistence harvests (Kruse, 1989).

Residents not only use subsistence products for much of their food, they also tend to harvest multiple types of subsistence resources. More than half of all households (61 percent) harvested at least four different types of fish, wildlife, and/or plant resources in 1987. One in ten households harvested more than 10 different types of resources (Kruse, 1989).

The use of subsistence resources in Southeast cannot be explained simply in terms of household harvest and consumption. Most subsistence harvesters give at least part of their harvest away. In 1987, a third of all households in rural Southeast Alaska gave away at least four different types of resources. Approximately two-thirds of the households reporting that they gave no resources away, did not harvest any resources themselves.

PER CAPITA FISH, GAME & PLANT HARVEST OF RURAL SOUTHEAST COMMUNITIES



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

What Subsistence Users Harvest

In terms of useable resources provided by the natural environment, Southeast Alaska is a land of abundance. In all, TRUCS (USFS, Tongass Resource Use Cooperative Survey, 1988) found forty-two different resource categories harvested for personal use. This variety provides opportunities for diverse diets, depending on individual tastes and preferences. The availability of subsistence resources is not uniform throughout Southeast. The uneven distribution of subsistence resources may, in part, explain variations in the diversity of harvest activity among rural Southeast's communities. Edna Bay subsistence resource harvesters gather the most diverse number of resources while residents of Skagway harvest the least. Geographic differences in the richness of the resource base may explain community differences both in the mean per capita harvest and percent of protein from such harvests. In addition to the geographic aspects of the land base, harvest regulations and other sociocultural considerations are also factors that determine levels and diversity of resource harvest (Kruse, 1989).

The diversity of resource harvest activities does not vary greatly by size of place, income, length of residence, or ethnicity. Forest-wide, however, there is a slight tendency for households located in small communities, and households with lower incomes, to harvest a greater variety of resources than other households. Figure 3-37, Rural Communities Resource Uses, identifies the resources used by the rural communities of Southeast Alaska.

Figure 3-37 has been developed primarily from the information supplied in the Tongass Resource Use Cooperative Survey. Supplemental information and verification of information supplied from the TRUCS data has been obtained from Alaska Department of Fish and Game, Division of Subsistence, Technical Reports for the communities of Angoon, Haines, Klawock, Klukwan, Petersburg, Sitka, Skagway, Tenakee Springs, Wrangell and Yakutat. These technical reports provide site-specific detail related to the communities from which information was gathered while the TRUCS information is by community and related Southeast-wide.

FIGURE 3-37

RURAL COMMUNITIES RESOURCE USE

Resource	Cape Pole [4]	Meyers Chuck	Kasaan	North Whale Pass	Point Baker	Elfin Cove	Edna Bay	Port Protection	Hollis	Port Alexander	Hyder	Klukwan	Tenakee Springs	Gustavus	Coffman Cove	Saxman	Pelican	Hydaburg	Angoon	Thorne Bay	Yakutat [1]	Kake	Skagway	Hoonah	Klawock	Craig	Metlakatla	Haines	Wrangell	Petersburg	Sitka
Wildlife																															
Deer	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Moose		●		●			●				●					●	●			●	●				●	●		●	●	●	
Mountain Goat											●									●	●		●					●	●		●
Black Bear				●	●		●	●	●	●	●	●						●		●	●		●	●	●	●		●	●	●	●
Brown Bear [2]																															
Waterfowl		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Seabirds		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Furbearers		●	●	●		●	●	●	●	●	●		●	●	●		●			●	●		●	●	●	●	●	●	●	●	●
Small Game		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●
Fisheries																															
Salmon		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Other finfish		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Invertebrates		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Marine Mammals																															
Harbor Seal			●	●						●	●	●	●		●	●	●	●	●		●	●		●	●	●	●			●	●
Other mammals		●					●		●				●				●							●			●			●	●
Plants																															
Beach greens		●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●
Seaweed		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Berries		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Firewood		●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Green Timber		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roots																								●	3						

SOURCE: Subsistence Use of Renewable Resources by Rural Southeast Alaska Residents, Draft 2/1989

[1] Fish and Wildlife Use in Yakutat Alaska, 5/86
[2] No Data Collected Specific to Subsistence Use
[3] Hanlon v. Barton
[4] No Data Available

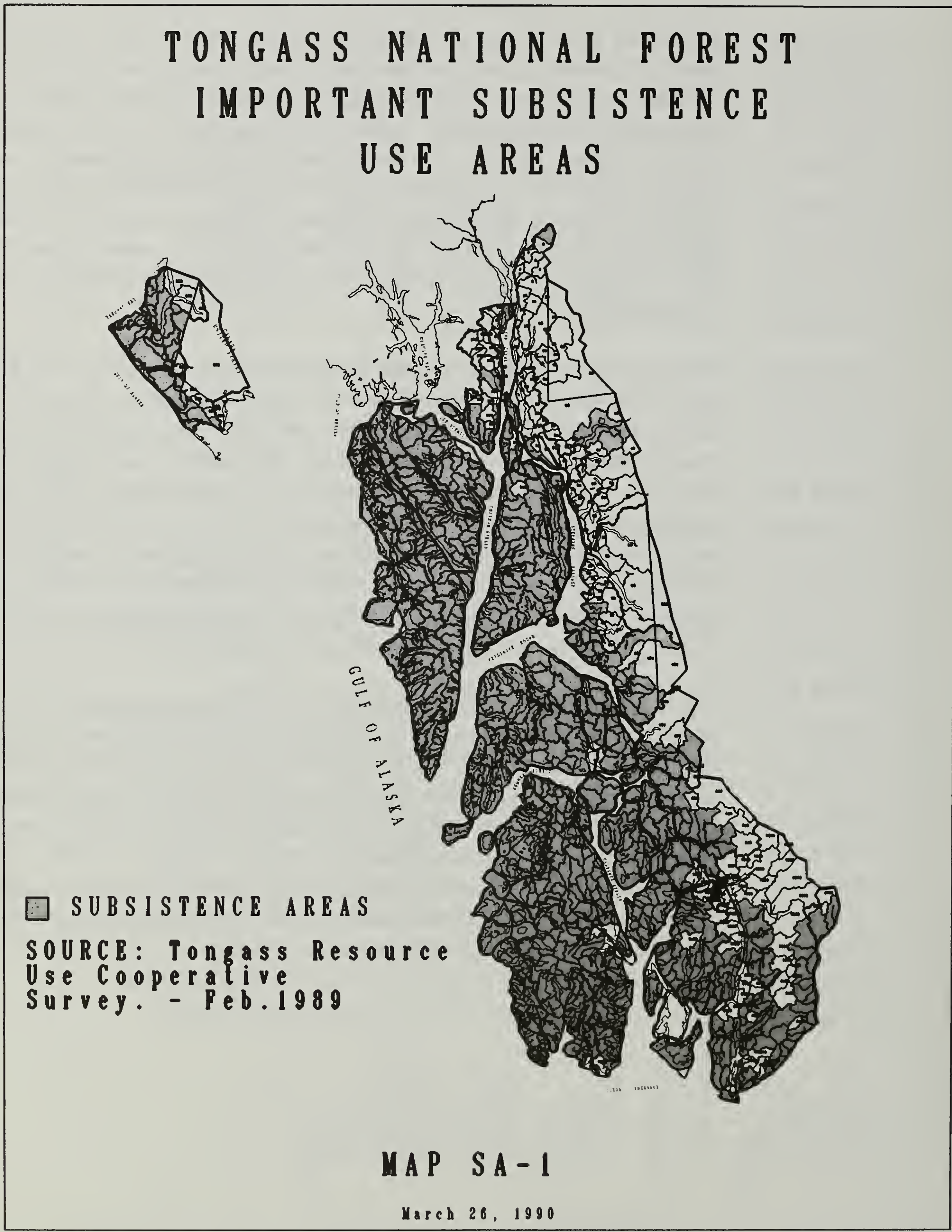
Where Subsistence Harvest Occurs

Historically, subsistence use occurred where access to the resources cost less in energy than the resources gathered. Many of the gathering activities occurred in easily accessed areas. These activities occurred close to settlements where they could be accessed by foot or boat. Over time as new technology developed, ease of access meant a movement outward into new resource use areas. The motorboat and development of road systems associated with logging activities in Southeast Alaska have had perhaps the greatest influence on subsistence gathering activity. Today, all communities may be accessed by motorized boats and many are tied to interior lands by road systems. As new roads are developed, subsistence use moves from areas with higher access costs to areas with easily achieved access. At Yakutat, much of the historical subsistence access occurred along the many miles of coastal fringes. Since the construction of Forest Highway 10 subsistence gathering activities have moved inland.

Individual communities throughout Southeast Alaska have distinct home ranges with concentrated use (See Appendix N, Individual Rural Community Important Subsistence Use Areas and Individual Rural Community Draft Maps for each of the rural designated communities of Southeast Alaska). A wide range of use on a less concentrated scale exists outside the normal home range. If all rural communities of Southeast Alaska and their important subsistence use areas are considered, most of the forested lands of the Tongass accessible by boat, vehicle or small plane are used for subsistence gathering purposes (USFS, Tongass Resource Use Cooperative Survey, Draft Maps, 1988 and ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165).

Figure 3-38 identifies important watersheds where subsistence gathering activities occur. This map is a composite of Southeast communities based on information identifying "importance" as the most reliable and most frequently used deer hunting areas, upland salmon harvest use areas, (USFS, Tongass Resource Use Cooperative Survey, 1988) and data gathered on other game species such as moose from Alaska Department of Fish and Game (ADF&G) Technical Papers. Appendix N identifies individual VCU's (Value Comparison Units) use by community for the Tongass National Forest. VCU's used by more than one community are grouped in this section to show overlapping ranges of use.

FIGURE 3-38


TONGASS NATIONAL FOREST
IMPORTANT SUBSISTENCE
USE AREAS
GULF OF ALASKA
SUBSISTENCE AREAS
SOURCE: Tongass Resource
Use Cooperative
Survey. - Feb.1989
MAP SA-1
March 26, 1990

Data used to generate the Important Subsistence Use Areas of Southeast Alaska Map, as well as the individual rural community maps found in Appendix N, should be considered drafts. The maps have been generated from "raw" (unedited) interviewer's data generated from the Tongass Resource Use Cooperative Survey (1988). This data has undergone some review from the Alaska Department of Fish and Game, U.S. Forest Service and rural communities of Southeast Alaska. This data, as well as new data gathered from the community reviews (conducted January-April, 1990), public and agency review of the Revision DEIS, and any other pertinent data will be considered between the publication of the Revision DEIS and FEIS.

Abundance/ Distribution

Wildlife. Wildlife populations for deer, moose, mountain goat, black and brown bear, furbearers and small game range from low to high across Southeast. Trends in population levels for all species range from stable to increasing (USDI, Subsistence Management and Use, 3/88).

Sitka black-tailed deer are important subsistence resources for Southeast Alaska's rural residents. In 1987, deer constituted 21 percent of the total pounds of subsistence resource harvested by rural residents with an estimated 11,600 deer being harvested by 3,000 households. Over one-third (37 percent) of all rural households harvested at least one deer (Kruse, 1989).

Deer harvest levels vary substantially by community. Residents of Edna Bay, Port Alexander, Pelican, Tenakee Springs, Hoonah, and Angoon harvested an average of 250 pounds (80 pounds of useable meat per deer) per household in 1987. These communities are in close proximity to prime deer habitats with healthy deer populations. Liberal regulations have allowed relatively high harvest levels. Harvest levels were understandably lower in communities located away from areas of high deer populations (Kruse, 1989).

"Land mammals other than deer" account for only 4 percent of the total harvest of edible subsistence resources. In 1987, at least 30 percent of the households in Edna Bay, North Whale Pass, Thorne Bay, and Meyers Chuck harvested land mammals other than deer. These mammals included moose, black bear, or furbearers (Kruse, 1989).

Expressed in mean pounds, the harvest of land mammals other than deer is highest in Petersburg and Wrangell where moose was harvested by 9 and 7 percent of the households, respectively. Other land mammals were much more likely to be harvested by low income households (Kruse, 1989).

Waterfowl. Waterfowl and seabirds range throughout Southeast Alaska with population fluctuations occurring seasonally as birds migrate from summer to

winter feeding grounds. Many areas lack accurate population information and population trends are difficult to identify.

In 1987, duck and geese populations which migrate along the Pacific Flyway showed decreases from their ten-year averages; declines appear to be primarily related to overharvest (USDI, Subsistence Management and Use, 3/88).

In rural Southeast Alaska bird harvest constitutes a negligible percentage of the total subsistence harvest with a third or less of the households in all communities except Edna Bay harvesting birds. Although ducks are the most important type of bird harvested, they contributed an average of only four pounds of edible meat per household per year. Households associated with the highest bird harvest levels are high income, white, and residing in Petersburg. These findings suggest that birds may be more culturally important to rural Southeast residents who grew up in areas where waterfowl hunting was a common activity (Kruse, 1989 and ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165).

Marine Mammals. The only marine mammal harvested, at least in part, for its meat by rural Southeast residents is the harbor seal. Harbor seal accounts for only 3 percent of the total subsistence harvest. In 1987, 400 rural Southeast households harvested some 1,900 marine mammals including 1,500 harbor seal. The principal communities involved in the harvest of marine mammals are Angoon, Hoonah, Kake, and Yakutat. In these communities between a quarter and a third of all households harvested harbor seals in 1987 (Kruse, 1989).

No data is available on the populations and trends of the harbor seal. The species is found throughout Southeast Alaska and appear to be in excess of the demands placed on it by subsistence users.

Salmon. Commercial catches of salmon statewide have been recorded in excess of 100 million fish for the seventh straight year. Between 1978 and 1985, catches for subsistence use increased steadily. (No specific data was available on subsistence harvest during the 1983-84 season). In 1985 commercial fishery users logged the all-time high harvest of 146.7 million fish. This was substantially greater than previous records set during the 1930's when Alaskan waters and streams were unregulated (USDI, Subsistence Management and Use, 3/88).

Harvests of all salmon species constitute 21 percent of the total harvest of subsistence resources. More that 1.2 million pounds of edible salmon were harvested in 1987. More than half of all households in rural Southeast Alaska harvested at least one salmon. Substantial percentages of households in all communities harvested salmon in 1987. Species harvested by the largest percentage of households in the region as a whole were kings (42 percent)

and cohos (38 percent). The 508,000 pounds of kings harvested in 1987 account for 42 percent of the total subsistence salmon harvest.

In Southeast, pink salmon are the most abundant species, but sockeye are preferred by subsistence users. Commercial net fishermen prefer pinks and chums. Although historically, many of the sockeye salmon habitats in Southeast have been highly productive, sockeye salmon are now in low supply. It is believed that overharvesting through interception by commercial fishermen prevents the salmon from reaching spawning grounds and subsistence use areas (USDI, Subsistence Management and Use, 3/88).

Numbers of chinook salmon are currently depressed all along the Southeast coast. The major chinook spawning streams are large bodies of water with high turbidity. This prevents accurate escapement counts and makes management for maximum sustained yield difficult (USDI, Subsistence Management and Use, 3/88).

Other Finfish. Finfish other than salmon account for 24 percent of the total subsistence harvest by rural Southeast residents. Sixty-one percent of all households were involved in this harvest in 1987; over half of the households in rural communities except Skagway and Metlakatla harvested at least some finfish other than salmon (Kruse, 1989).

Found throughout Southeast Alaska finfish other than salmon are comprised of halibut, cod, flounder, sole, rockfish, herring, steelhead, trout and Dolly Varden. Halibut is the most commonly harvested finfish other than salmon with 48 percent of all households catching one or more halibut in 1987. Like salmon, halibut is a widely exchanged resource. A third of all rural Southeast households gave away at least some halibut in 1987 and half of all households received at least some halibut. Communities in which households harvest relatively high amounts of halibut include Meyers Chuck, Edna Bay, Pelican, Gustavus, and Yakutat (Kruse, 1989).

Invertebrates. Invertebrates constitute 16 percent of the total subsistence harvest in Southeast. Almost half of the rural Southeast residents harvested invertebrates in 1987. The percentage of households harvesting invertebrates varied from 10 percent in Klukwan to 100 percent in Kasaan . The species harvested by the largest percentage of residents are clams and cockles (32 percent) and dungeness crab (28 percent). Another notable invertebrate resource is shrimp which is harvested by at least a third of all households in Edna Bay, North Whale Pass, Yakutat, Hollis, Meyers Chuck, Elfin Cove, and Hyder. Also important on a regional basis are abalone, gumboot, herring eggs, king crab, tanner crab and octopus (Kruse, 1989). All species of invertebrates range throughout the waters of Southeast Alaska. Abalone is available on the outer coasts. Except in areas of overharvest, invertebrate resource appear to be abundant with

subsistence harvest being high (USDI, Subsistence Management and Use, 3/88).

Sea cucumber is an important resource in at least 13 communities. Communities in which at least 20 percent of all households harvested sea cucumber include: Hollis, Edna Bay, Point Baker, Thorne Bay, Kasaan, and Meyers Chuck. Sea urchins are important to Yakutat and Edna Bay. Scallops are harvested by at least 10 percent of all households in Edna Bay, Meyers Chuck, Craig, and Hollis. On the average, long-term Native households harvest more invertebrates than other households (Kruse, 1989).

Plants. Over half of all rural Southeast Alaska households harvest edible plants. Plant products account for only 3 percent of the total subsistence harvest. Berries of various types make up the largest component of the plant harvest. More edible plants are harvested by the residents of smaller communities, by low income households, and by Natives (Kruse, 1989).

Firewood. Firewood is also an important component of the plant resources. Forty-six percent of all rural Southeast Alaska households harvested an estimated total of 26,000 cords of firewood in 1987 averaging three cords per household. Firewood is also a shared resource, with 13 percent of all households giving firewood away and 10 percent of all households receiving firewood (Kruse, 1989).

Summary: The historical significance of fish, wildlife, and other renewable natural resources to the residents of Southeast Alaska has been amply documented (Krause, [1885] 1956; Suttles, 1968; Oberg, 1973). The Tlingit, Haida, and Tsimshian Indians depended on the harvest and use of renewable natural resources as the basis of their way of life. The process of modernization has had tremendous impact on the aboriginal peoples of Southeast Alaska. Most importantly, the subsistence economy that characterized Southeast Alaska society during the pre-contact period has gradually given way to a mixed economy characterized by public (government) sector, private (market) sector, and subsistence sector components (Glass, 1987; Glass, Muth, and Flewelling, 1990). Among the Native peoples, subsistence activities involving fish and wildlife may not be as pervasive as they were in the past, but they have shown considerable persistence, adaptability, and stability. In addition, non-Native people in Southeast Alaska have also come to depend on renewable natural resources provided by the land and waters of the Tongass National Forest to support their own version of subsistence lifestyles. Among other things, the boom-and-bust cycles of the contemporary market economy of Southeast Alaska may have served to underscore the importance of subsistence harvest, sharing, and consumption as a form of "social insurance" to guard against the uncertainties of the cash economy.

The continuing importance of subsistence resources to both Native and non-Native residents of contemporary Southeast Alaska is illustrated by two region-wide studies of resource use conducted in 1979 (the Alaska Public Survey--APS) and 1988 (the Tongass Resource Use Cooperative Survey--TRUCS). The APS survey, administered to a random sample of over 1,200 people in nearly all the communities in Southeast Alaska, posed questions about food-producing activities. Research results indicated that local, wild food resources were used extensively by Southeast Alaskan residents. As reported by Alves (1980), approximately 80 percent of the adult population in Southeast Alaska participated in hunting, fishing, or gathering (e.g., berry-picking, seaweed-gathering) activities. By means of these activities, people directly procured for themselves a sizeable portion of their own food budgets: "Our data indicate that about 80 percent of the households surveyed provided some of their own food; on the average households in the region directly supplied 30 to 40 percent of the meat, fish, and fowl consumed (Alves, 1980, p. v-3.)." In addition to resource harvest, resource sharing contributed to household food budgets as well. According to Alves (1980, V-3), through a combination of harvest and sharing, ". . . benefits of local food resources touch 90 percent of all households" in the region. This compares favorably with information (presented above on a resource-by-resource basis) collected in the TRUCS study. In analyzing data from the TRUCS study, Kruse and Muth (1989, p. 5) observed:

> Only 15 percent of rural Southeast households harvest no subsistence food. Half of all households (51 percent) reported harvesting more than 80 pounds of edible subsistence product per capita in 1987. A quarter of all households harvest more than 250 pounds per capita.
>
> Much of the subsistence harvest is directly incorporated into household diets. Almost one in three households gets at least half of the food it consumes from its own harvest activities. A total of 40 percent of all households gets at least 25 percent of its food from household subsistence harvests.
>
> Residents not only use subsistence products for much of their food, they also tend to harvest multiple types of subsistence resources. More than half of all households (61 percent) harvested at least four different types of fish, wildlife, and/or plant resources in 1987. One in five households harvested more than 10 different types of resources.

In addition, the TRUCS data confirm the continuing vitality of resource sharing in the lifestyles of Southeast Alaska residents. In analyzing the TRUCS data, Kruse and Muth (1989) found that 78 percent of the respondent households surveyed in Southeast Alaska gave fish, wildlife, and/or plant resources (e.g., berries, firewood, beach greens, etc.) to other households. And of the respondents who reported that gave no resources away, approximately two-thirds of

those households--some of which may contain the elderly, the widowed, or the infirm--didn't harvest any resources for themselves either.

The Alaska Public Survey and the Tongass Resource Use Cooperative Survey confirm the continuing reliance of rural households on a wide variety of renewable natural resources provided by the Tongass National Forest. Resource management that is sensitive to subsistence not only as a legal mandate, but as a chosen lifestyle will be needed to help ensure that subsistence uses of renewable natural resources remains a viable lifestyle in Southeast Alaska.

Access

Many Southeast communities are accessible only by air and water. Only Skagway, Haines and Klukwan have access to the interior by road, with many other communities served by the Alaska Marine Highway System (Table 3-87, Available Access to Southeast Alaska Communities).

Roadbuilding, a byproduct of timber harvesting and to a much lesser extent mining, is an important change agent in Southeast. These road networks provide greater access to areas previously unconnected and affect subsistence both positively and negatively by providing access, dispersion of hunting and fishing pressure, and the potential for increased competition. On Prince of Wales Island, for example, areas that have become road-connected are now more easily reached through the Marine Highway System, thus providing greater access from Ketchikan, one of the most populated cities in the region and considered by State regulation as non-rural in subsistence designation. While road systems tend to bring more people into an area, they also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest (USDI, Subsistence Managment and Use, 1988)

By nature, Southeast Alaska is comprised of isolated islands unconnected by road systems. However, with the transportation means available to Southeast Alaska residents (floatplanes, Marine Highway System, automobiles, boats), Southeast residents are very mobile in their subsistence resource use activities. Wrangell, fifth largest community in Southeast, has documented their subsistence gathering from the southern tip of Prince of Wales Island to Yakutat, covering most of the islands in between (Kruse and Muth, 1989).

Competition

Southeast Alaska is a land of abundant resources, however, all the resources are not evenly distributed across the Tongass National Forest. Where the resources are confined to island groups or river systems, where access is costly or nonexistent, use of the resources is low. Where the resource is abundant, a community is present, but access by other communities is costly, thus the resource tends to be used primarily by the community which resides in the area. Where resources are abundant and access is available to local as well as other communities of Southeast, competition for the resources exist (USFS, Tongass Resource Use Cooperative Survey, 1988).

Increased competition results when cheaper access to the area or within the area is provided. Such is the case when road systems are established to local communities. When areas historically not utilized for subsistence purposes are made available due to easier, more cost-effective access, the new area is utilized. When communities with road access to abundant resources are connected to the Alaska Marine Highway System or to commercial air services, then competition for the resources is generated from outside communities with lower abundance of the same resource.

Examples of such uses are readily available in Southeast. Chichagof Island, Prince of Wales Island, and the Yakutat Forelands at one time were isolated portions of the Tongass with limited use from communities in the vicinity. Today, road construction, primarily due to timber harvest activities, has created vast areas in each location readily available from the local community. Access provided by the Alaska Marine Highway System and small commuter planes to Chichagof and Prince of Wales Islands allows easy accessed from off-island communities. The Yakutat Forelands have been made readily available from the access provided by the Alaska Airlines connection. Access to the Yakutat Forelands is perhaps one of the better contacts of the lower forty-eight to Alaska's abundant fisheries and brown bear populations.

Tenakee Springs, although not having a vehicle off-loading ramp at its ferry terminal receives increased use of its roaded connections in the Indian River drainage. This use is primarily in the form of foot traffic, but has in the past increased due to all terrain vehicle activity. Tenakee has easy access to other roaded areas (Kadashan/Corner Bay) with access by small boat. Being close to the urban-designated city of Juneau, increased competition for resources has occurred (USFS, Alaska Lumber and Pulp Company 1981-86 and the Alaska Pulp Corporation 1986-90 Operating Period Final Environmental Impact Statements).

Competition for the resources will continue to rise as the demand placed on subsistence resources found in Southeast Alaska increases and more areas of the Tongass are developed. The Southeast Advisory Boards have recently noted this increased use of the resources and have recommended decreases in harvest of deer, moose, and other game species for non-rural residents. These recommendations have been recognized by the State's Game Board and implemented on areas such as Chichagof Island and the Yakutat Forelands.

Future Trends

Abundance/ Distribution

The availability of habitat and use patterns of subsistence gathering have changed throughout the Tongass due to timber harvest and roading activities. Timber harvest in close proximity to communities on Federal, State and Native lands, has significantly changed use patterns in terms of access and availability of resources.

With mining interests again taking a hard look at the resources of the Tongass National Forest, the potential for major developments is likely. Since minerals are not likely to be centered around established communities, development of minerals is likely to result in new camps and services for exploration, development, and production of ore.

Access

New road systems will be constructed into previously undeveloped watersheds. This activity will likely continue for forty to fifty years until previously harvested areas are available to supply the timber industry with higher volume second-growth stands. As have been documented in the historical trends of subsistence gathering activities, new access will provide additional opportunitites for subsistence use activities.

State lands selected from the Tongass National Forest with community development in mind will be the basis of new settlements in previously uninhabited areas. Access will evolve from these settlements as it has with communities such as Thorne Bay and Edna Bay. Such settlements will become staging areas from which other developed systems may be accessed by users.

New access could potentially increase subsistence resource harvest Forest-wide. With access comes the problems associated with competition for and overharvest of isolated resource populations. In order to meet the needs of the subsistence harvester, and the recreational and commercial resource interests, regulation of subsistence resources will have to be responsive to on-the-ground conditions.

Competition

As a result of economics, access, population growth, abundance, and distribution changes, increased demand and competition are expected for subsistence, recreational, and commercial resources. Habitat reductions potentially may confine the numbers and distribution of fish, game and plant species to isolated tracts making confined competition even more pronounced.

Proper regulation of harvest in all three categories of use (subsistence, recreational, and commercial) can ensure even distribution of harvest. Habitat management for all subsistence resources should occur not only on public land, but must be a consideration on private lands which are near established communities. Designated wilderness on the Tongass provides the habitat needed to produce these resources, but, important subsistence use areas are not confined only to the Wilderness lands of Southeast. Important subsistence use areas are inclusive of all public and private lands.

Isolating the projected impacts on deer population levels (and, thus, subsistence harvest) resulting from forest management activities is a difficult analytical task. Deer populations are influenced by a wide variety of other factors unrelated to Forest Service management activities. These factors include naturally-occurring fluctuations in deer populations, predation pressure, disease, climatic conditions

(e.g., severe or mild winters), changes in the demand for deer due to increases or decreases in human populations, the availability of infrastructure such as ferry terminals and airstrips, and State harvest regulations. Identifying the effects of all of these variables is currently beyond state-of-the-art analytic impact assessment.

Providing for the needs of subsistence users is only partly a function of habitat capability and resource availability. Harvestable deer populations are a necessary, but not sufficient, condition to meet the demands posed by subsistence deer hunters. Social and institutional factors--over many of which the U.S. Forest Service has little control--often serve as greater constraints on subsistence use than the relative availability of game does. For example, providing harvestable deer population levels is of little benefit if a private landholder closes road access to his/her property to deerhunters. If the regulatory structure allows unrestricted competition from non-rural sport hunters, the presence of a harvestable abundance of deer far from ensures that subsistence needs will be met. Unfortunately, the effects of regulations on subsistence harvest, distribution and exchange, and consumption patterns of Southeast Alaskan residents has received very little reseach. In this regard, a supportive regulatory structure sensitive to the needs of subsistence harvesters, as well as cooperation between Federal, State, and private landowners, will be as important as harvestable deer populations in providing continuation of the subsistence lifestyle (Muth, 1989). With this in mind, the following section discusses the effects of the alternatives on subsistence activities.

SUBSISTENCE

ENVIRONMENTAL CONSEQUENCES

DIRECT AND INDIRECT EFFECTS

Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires a Federal agency, having jurisdiction over lands in Alaska, to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such federal agency:
>
> (1) gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;
>
> (2) gives notice of, and holds, a hearing in the vicinity of the area involved; and
>
> (3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

The Affected Environment section displays the historical, current and anticipated subsistence use trends by rural communities of the Tongass National Forest. The present section evaluates how the proposed management area prescriptions for the Tongass Land Management Plan Revision could affect subsistence resources used by the rural communities of Southeast Alaska. The subsistence resource categories evaluated are wildlife, fisheries, marine mammals, and

abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from non-subsistence users for the subsistence resource categories.

The evaluation determines how subsistence uses on the Tongass may be affected by the standards and guidelines and land use patterns allocated by the proposed alternatives. This evaluation considers:

(1) the availability of subsistence resources on adjacent lands,
(2) alternative actions in a range of management emphases,
(3) mitigative means of lessening impacts related to proposed actions,
(4) the cumulative impacts of past, present and reasonably foreseeable future activities on subsistence users and resources,
(5) potential cultural and social implications affecting subsistence users, and
(6) the mapped important subsistence use areas of the Tongass National Forest (Figure 3-37).

Data for the evaluation is based on, but not limited to, the Tongass Resource Use Cooperative Survey (1988), Draft Subsistence Use of Renewable Resources by Rural Southeat Alaska Residents (1989), Subsistence Management and Use Report (1989), Alaska Department of Fish and Game (ADF&G) Technical Reports on subsistence uses for surveyed communities in Southeast Alaska, Alaska Public Survey (1979), ADF&G Hunter/Harvest Survey data, the Geographic Information System (GIS) Database developed by the U.S. Forest Service for the Revision and wildlife habitat capability models developed for the Revision by the U.S. Forest Service, Region 10 in cooperation with the Alaska Department of Fish and Game and other State and Federal Agencies (See Wildlife section in this chapter). The Tongass Resource Use Cooperative Survey is considered a "snapshot" in time reflecting subsistence use statistics for only a brief time subsistence harvest of the resources has occurred. Patterns identified from the Tongass Resource Use Cooperative Survey, are compared with other available subsistence data for establishing trends in use. Subsistence users are defined as all residents of Southeast Alaska residing in communities outside Juneau and Ketchikan. Juneau and Ketchikan have been designated non-rural and do not qualify for subsistence use.

Evaluation of Effects on Subsistence Users and Needs

This evaluation focuses on all the rural communities of Southeast Alaska which utilize the Tongass for subsistence purposes. The Tongass Resource Use Cooperative Survey (TRUCS) was used to identify the portions of the Tongass where the most reliable and most frequently used deer harvest areas occur as well as upland salmon harvest areas. These mapped areas (identified by sampled residents of the 31 rural communities in Southeast Alaska) represent the broadest areas of subsistence use, with exception of historical areas, ever hunted for deer. Historical use areas was not the basis of the mapping effort due to present distribution of some game species, notably deer.

During the TRUCS survey, a sample of residents in Southeast Alaska communities were asked to map their subsistence use areas. (For a more detailed discussion of the methodology see Kruse, Frazier, and Fahlman, 1988.) These household-level subsistence use maps were digitized into the Geographic Information System (GIS) database. Household-level maps were aggregated together to form "composite" maps illustrating the number of households using different areas. "Importance" of an area for subsistence purposes was assigned by its present day use based on its reliability for producing resources and the frequency by which individuals used the area. Regardless of the number of individuals, households or communities using an individual watershed, if present day use indicated that it was used by one or more individuals frequently or that it was a reliable area from which a particular game species was harvested, then it was identified as being "important" to current subsistence gathering activities.

This approach does little to account for other indicators of "importance," such as areas of symbolic meaning, areas of religious or spiritual significance, and other ways in which a community may define a site specific area as "important" to its residents. Given the broad, programmatic scope of the TLMP Revision, it was felt that measures of reliability and frequency of use constitute the most readily available, consistent, and equitable definition of important areas.

During the identification of "important subsistence use areas", if a portion of a watershed was identified as being utilized, then the entire watershed was identified as being "important". Supplemental information used in determining where subsistence harvest takes place was obtained from the Alaska Department of Fish and Games' Technical Reports for surveyed communities in Southeast Alaska. From a community composite of the mapped "important" subsistence use areas, a determination can be made that most of the forested lands of the Tongass are used for subsistence purposes if access is available and if sought-after resources exist. Areas not utilized for subsistence purposes were found to be in locations such as the Juneau Icefields, the mainland areas between Taku Inlet and Windham Bay, portions of the interior mainland far removed from normal access means, the Brabazon Range Addition, and interior portions of Misty Fiords National Monument (Figure 3-38, Important Subsistence Use Areas of the Tongass).

The intent of this evaluation is to find if implementation of any of the proposed Alternatives would lead to activities that "may" cause a significant possibility of a significant restriction of subsistence uses on the Tongass National Forest. The evaluation analyzes the expected effect on subsistence resources in terms of:

(a) reduction in the subsistence uses due to changes in availability of fish and wildlife resources caused by an alteration in migration or location (abundance/distribution);

(b) reduction in subsistence uses due to limitations on the access to harvestable resources, such as by physical or legal barriers (access); and

(c) reduction in uses due to factors such as direct impacts on the resource, adverse impacts on habitat, or increased competition for the resources (competition).

The Alaska Land Use Council's definition of "significantly restrict subsistence use' is one guideline used in the evaluation. By this definition:

> A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by non-rural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make a decision after reasonable analysis of the information available.

The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional definitions of "significant restriction of subsistence uses" and are also used as a guideline in the evaluation and preliminary finding:

> Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents).
>
> Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in...non-rural resident hunting.
>
> In light of this definition the determination (finding) of significant restriction must be made on a reasonable basis, since it must be decided in light

of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle.

Demand

Future demand placed on subsistence resources is variable and dependent on populations of rural communities in Southeast Alaska, fish and game regulations, abundance of resources, and conditions such as employment, weather, access and competition. Statewide population estimates between 1980 and 1986 indicate a relatively constant rate of increase. Between 1987 and 1988, a dramatic decrease in population resulted (Alaska Department of Labor, July 10, 1989, News Release #90-03). For Southeast Alaska, population estimates have not indicated as drastic a decline as that of the rest of the State, but a net loss has occurred. Most loss of population has been in the larger towns of Juneau, Ketchikan and Sitka with the smaller communities remaining stable or increasing slightly in population. Southeast-wide a moderate net loss has occurred.

The outlook for the State for 1990-1991, as well as Southeast, anticipates population increases due to the projected short-term economic growth in most sectors of Alaska's economy (ADL, Alaska Economic Trends, 1990-1991 Employment Forecasts, 1990). Dependent on several factors which will have significant bearing on the population trends in preceding years, this trend is expected to remain constant. The U.S. Department of Commerce, Bureau of Economic Analysis latest forecast for the U.S., as well as individual states, projects a constant population increase for the state of Alaska from 1990 through 2035 (USDC, Bureau of Economic Analysis, 1985). Due to the uncertainty of the economic factors associated with such issues as the Tongass Timber Reform Bill, Native timber harvest in Southeast Alaska, oil production, mining industry development and others; for analysis purposes in the Revision DEIS, the population of rural communities in Southeast Alaska is projected to increase by less than one percent over the next ten years and little or no increase from the year 2000 to 2030. Considering fluctuations that may arise as a result of present economic factors, no net loss in population is predicted for the next five decades.

Alaska game regulations vary substantially by area, species, and season. Regulations are dependent on the predicted abundance of game and fish resources for specific Game Management Units developed by the Alaska Department of Fish and Game. Game and fish regulations in place for the 1988-1989 hunting, fishing, and trapping season have been used to analyze subsistence harvest allocations for the Revision DEIS. Because of potential for change in resource abundance levels and the potential takeover on July 1, 1990 by the Federal government as a result of the *McDowell v. State of Alaska*, these regulations are subject to change.

Abundance and distribution of game and fish species vary considerably across the Tongass National Forest. Total harvest (commercial and sport) for most

species is well documented based on the annual Alaska Department of Fish and Game Hunter Harvest Surveys (ADF&G, Division of Wildlife Conservation; Furbearers, 1988; Moose, 1988; Mountain Goat, 1988; Small Game/Upland Game, 1988; Black Bear 1/87-12/87; Brown Bear, 1/87-12/87; Deer, 7/87-6/88; and ADF&G, Southeast Alaska Fish and Wildlife News, 1990). For the latter part of the 1980's, subsistence harvest is well documented for some species such as deer, and not known for some of the other species. Demand projections for each of the species used in the Revision is based on harvest between the years 1980 and 1988.

Harvest data from 1980 to 1988, predicts demand for most subsistence resources to increase annually. Stable to steady increases in harvest have been recorded during this period for most of the major consumptive resources such as deer and salmon. Deer harvest has increased dramatically since 1980. Increases in herd sizes are attributable to the present weather trends, which have resulted from overwinter survivals at higher than historic levels. The result of having more animals to hunt has increased success rates in nearly every major Game Management Unit found on the Tongass.

Salmon populations have increased since 1975. Commercial, sport and subsistence harvest have increased steadily for all salmon species found in Southeast Alaska. Predictions based on the last nine years' use patterns show a continuing steady demand for the resource.

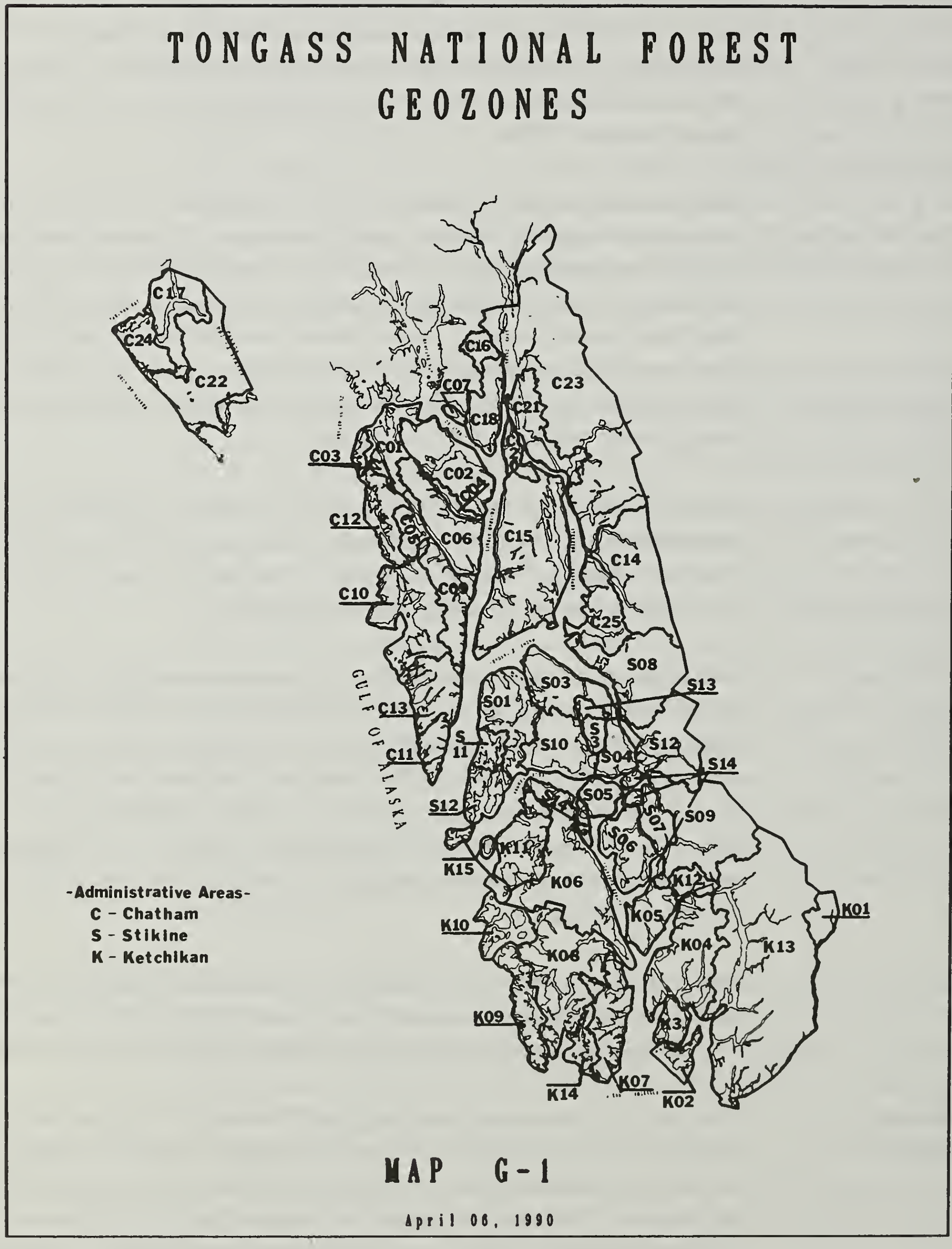
Other factors such as weather patterns, access availability, and competition are difficult to model, but have been assumed, for analysis purposes, to either remain constant or increase. Fluctuations in weather patterns and the effects of severe winters on subsistence resources are assumed to remain constant. Due to continued roading based on timber harvest activities and to a lesser extent on mining activities, access has been assumed to increase. Because competition cab be regulated by game and fish harvest regulations, it is assumed to remain constant.

Based on use patterns documented by the Alaska Department of Fish and Game Hunter Harvest Records for the period 1980-1988, overall demand for the resources found in Southeast is modeled as increasing for most resources.

Abundance/ Distribution

References to Geozones (or Geographic Zones, planning units of the Revision DEIS) are made throughout the remaining portions of this section of Chapter 3. Figure 3-39 is entered here for reference purposes associated with the following discussions. All Geozones begin with a letter designation followed by two numbers. The letters 'C', 'S', or 'K' identify the Administrative Area of the Tongass associated with the Geozone, i.e., Chatham, Stikine or Ketchikan respectively. The total number of Geozones on the Forest is fifty-one, twenty-three on the Chatham, fourteen on the Stikine and fourteen on the Stikine.

FIGURE 3-39


TONGASS NATIONAL FOREST
GEOZONES
C17
C24
C22
C16
C23
C07
C21
C18
C03
C01
C02
C12
C06
C15
C14
C10
C25
S08
S03
S13
C13
S01
S10
S12
C11
S04
S14
S05
S12
S09
K15
K06
K12
K01
K10
K05
K04
K13
K08
K09
K07
K14
K02
GULF OF ALASKA
-Administrative Areas-
C - Chatham
S - Stikine
K - Ketchikan
MAP G-1
April 06, 1990

Wildlife

The rural communities of Southeast Alaska harvest a variety of wildlife resources (Figure 3-37) The Tongass Resource Use Cooperative Survey found that wildlife make up about 26 percent of the per capita subsistence harvest with deer making up 21 percent of this total (Kruse and Muth, 1989).

Deer. Tables 3-80 through 3-86 display each alternatives' current and projected deer outputs. The tables are based on deer harvested in the 1987-88 hunting season and on modeling of deer habitat in 1987-88, 2000 and 2040 through the use of Habitat Capability Models developed for the Revision DEIS (Appendix B). Population estimates for deer are solely a function of habitat capability and form only an estimate of actual deer numbers which may or may not inhabit the Geozones displayed. Projected harvest demands for deer in the years 2000 and 2040 are a product of modeling Southeast Alaska resident population trends in comparison with deer harvested from 1980-1988. These demand estimates are based on estimated population trends for Southeast Alaska residents during the period 1980-2040. Deer population projections do not account for effects of weather patterns, predation, regulations, and rural community locations.

Tables 3-80 through 3-86 are based on data from the Revision database (2/90); Tongass Resource Use Cooperative Survey (1988); Draft Subsistence Use of Renewable Resources by Rural Southeast Alaska Residents (Kruse and Muth, 1989); Alaska Department of Fish and Game, Division of Wildlife Conservation, Annual Report of Survey-Inventory Activities-Deer (1 July 1987-30 June 1988); Bureau of Economic Analysis Regional Projections (USDC,1985), and Habitat Capability Models (Suring, L.H., et al., 1988). Columns within the tables are defined as:

Column Title	*Definition*
1 **Geozone**	One of fifty-one planning units developed for analysis of the resources for the Revision DEIS (Source: Revision Database 2/90)
2 **Sub Use**	Identifies whether subsistence use takes place within the Geozone listed; Y=activity exists, N=No use documented.
3 **Roads**	Identifies if roads are established within the Geozone; Y=Roads exist, N=no roads exist and T=very small area of the entire Geozone is roaded, generally less than one percent (Source: Revision Database 2/90)

4	**Future Develop**	Management Area Prescriptions within the Alternatives identify future development (Source: Alternative Maps A-G).
5	**Ferry & Vehicle Access**	Rural communities attached to the Alaska Marine Highway System with road systems linked to the community (Source: Revision Database, 2/90 and ADOT, Alaska Marine Highway Schedule, Fall/Winter 1990)
6	**Com Access**	Community link available to road system without being connected to the Alaska Marine Highway System (Source: Revision Database 2/90)
7	**Modeled Harvest**	Habitat capability estimated by deer habitat model for the 1987-88 period. 10% above the winter fawn production.
8	**Modeled Harvest**	Habitat capability estimated by deer habitat model for the 2000 period. 10% above the winter fawn production.
9	**Modeled Harvest**	Habitat capability estimated by deer habitat model for the 2040 period. 10% above the winter fawn production.
10	**Total Harvest**	Estimated deer harvest for the 1987-88 hunting season (Source: ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June 1988)
11	**SUB Harvest**	Estimated Subsistence deer harvest for the 1987-88 hunting season (Source: ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June 1988)
12	**Harvest 2000**	Estimated Subsistence deer demand for the 2000 hunting season (Source: SAS Program and USDC, Bureau of Economic Analysis, 1985)
13	**Harvest 2040**	Estimated Subsistence deer demand for the 2040 hunting season (Source: SAS Program and USDC, Bureau of Economic Analysis, 1985)
14	**Total 87-88**	Column 10 minus column 7-Total Harvest for 1987-88
15	**SUB 87-88**	Column 7 minus column 11-Subsistence harvest for 1987-88
16	**SUB 2000**	Column 8 minus column 12-Subsistence harvest for 2000
17	**SUB 2040**	Column 9 minus column 13-Subsistence harvest for 2040

TABLE 3-80
ALTERNATIVE A: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

									Harvest							
				Ferry &		*Modeled*			*Total*	*Sub*	*Projected*			*Change*		
	Sub		*Future*	*Vehicle*	*Com*	*Harvest Population*			*Harv.*	*Harv.*	*Harv.*	*Harv.*	*Total*	*Sub*	*Sub*	*Sub*
Geozone	*Use*	*Roads*	*Develop*	*Access*	*Access*	*87-88*	*2000*	*2040*	*87-88*	*87-88*	*2000*	*2040*	*87-88*	*87-88*	*2000*	*2040*
#	*Y, N*	*Y, N, T*	*Y, N*	*Y, N*	*Y, N*	*#*	*#*	*#*	*#*	*#*	*#*	*#*	*#*	*#*	*#*	*#*
C01	Y	T	Y	Y	Y	264	239	239	421	163	281	517	(157)	101	(42)	(278)
C02	Y	Y	Y	Y	Y	963	1132	1123	1769	998	1413	2598	(806)	(35)	(281)	(1475)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	147	143	241	63	62	115	(121)	57	85	28
C05	Y	Y	N	N	N	167	129	129	726	582	384	707	(559)	(415)	(255)	(578)
C06	Y	Y	Y	N	Y	824	575	573	1092	336	745	1370	(268)	488	(170)	(797)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	262	262	807	711	1058	1944	(421)	(325)	(796)	(1682)
C10	Y	Y	Y	Y	Y	1263	1391	1391	3310	3140	3425	6296	(2047)	(1877)	(2034)	(4905)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	295	876	16	962	1767	(573)	287	(636)	(1472)
C21	Y	Y	Y	Y	Y	175	200	196	287	5	41	69	(112)	170	159	127
C22	Y	Y	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	2	1	6	6	196	332	80	80	(194)	(331)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1278	359	3	42	74	920	1276	1236	1204
K05	Y	N	Y	N	N	614	690	690	231	18	9	18	383	596	681	672
K06	Y	Y	Y	Y	Y	2758	2577	2009	2253	808	503	1020	505	1950	2074	989
K07	Y	N	Y	N	N	1377	1140	1020	116	14	110	224	1261	1363	1030	796
K08	Y	Y	Y	Y	Y	1544	1545	1372	310	127	312	632	1234	1417	1233	740
K09	Y	Y	Y	N	N	1085	1184	1178	51	36	324	656	1034	1049	860	522
K10	Y	T	N	N	N	826	896	896	11	11	574	1162	815	815	322	(266)
K11	Y	Y	Y	Y	Y	1734	1458	1292	512	232	378	766	1222	1502	1080	526
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1291	1081	0	0	65	151	1328	1328	1226	930
S02	Y	N	N	N	N	1053	1092	1091	0	0	53	122	1053	1053	1039	969
S03	Y	Y	Y	Y	Y	591	718	711	6	6	28	65	585	585	690	646
S04	Y	Y	Y	Y	Y	295	273	235	5	0	8	36	290	295	265	199
S05	Y	Y	Y	N	N	284	245	189	11	11	16	36	273	273	229	153
S06	Y	Y	Y	N	N	856	853	801	18	12	18	40	838	844	835	761
S07	Y	Y	Y	Y	Y	268	293	268	42	42	12	29	226	226	281	239
S08	Y	Y	Y	N	N	3400	453	407	29	29	149	357	3371	3371	304	50
S09	Y	Y	Y	N	N	326	388	362	12	12	14	33	314	314	374	329
S10	Y	Y	Y	N	N	919	843	843	0	0	47	108	919	919	796	735
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	197	185	158	157	9	21	67	68	188	164
TOTAL	49	35	30	14	15	32677	29215	27658	17955	9371	16671	31280	14722	23306	12544	(3622)

TABLE 3-81
ALTERNATIVE B: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

									Harvest							
				Ferry &		Modeled			Total	Sub	Projected		Change			
	Sub		Future	Vehicle	Com	Harvest	Population		Harv.	Harv.	Harv.	Harv.	Total	Sub	Sub	Sub
Geozone	Use	Roads	Develop	Access	Access	87-88	2000	2040	87-88	87-88	2000	2040	87-88	87-88	2000	2040
#	Y, N	Y, N, T	Y, N	Y, N	Y, N	#	#	#	#	#	#	#	#	#	#	#
C01	Y	T	N	Y	Y	264	238	230	421	163	281	517	(157)	101	(43)	(287)
C02	Y	Y	Y	Y	Y	963	1074	954	1769	998	1413	2598	(806)	(35)	(339)	(1644)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	148	117	241	63	62	115	(121)	57	86	2
C05	Y	Y	Y	N	N	167	129	125	726	582	384	707	(559)	(415)	(255)	(582)
C06	Y	Y	Y	N	Y	824	556	403	1092	336	745	1370	(268)	488	(189)	(967)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	239	225	807	711	1058	1944	(421)	(325)	(819)	(1719)
C10	Y	Y	Y	Y	Y	1263	1285	1249	3310	3140	3425	6296	(2047)	(1877)	(2140)	(5047)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	280	876	16	962	1767	(573)	287	(636)	(1487)
C21	Y	Y	Y	Y	Y	175	199	98	287	5	41	69	(112)	170	158	29
C22	Y	Y	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	11	22	5	17	29	30	47	(5)	(18)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	4	1	6	6	196	332	80	80	(192)	(331)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1095	359	3	42	74	920	1276	1236	1021
K05	Y	N	Y	N	N	614	690	629	231	18	9	18	383	596	681	611
K06	Y	Y	Y	Y	Y	2758	2477	1676	2253	808	503	1020	505	1950	1974	656
K07	Y	N	Y	N	N	1377	1041	910	116	14	110	224	1261	1363	931	686
K08	Y	Y	Y	Y	Y	1544	1476	1149	310	127	312	632	1234	1417	1164	517
K09	Y	Y	Y	N	N	1085	1184	946	51	36	324	656	1034	1049	860	290
K10	Y	T	Y	N	N	826	894	837	11	11	574	1162	815	815	320	(325)
K11	Y	Y	Y	Y	Y	1734	1458	1097	512	232	378	766	1222	1502	1080	331
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1177	922	0	0	65	151	1328	1328	1112	771
S02	Y	N	Y	N	N	1053	1088	1036	0	0	53	122	1053	1053	1035	914
S03	Y	Y	Y	Y	Y	591	718	710	6	6	28	65	585	585	690	645
S04	Y	Y	Y	Y	Y	295	338	227	5	0	8	36	290	295	330	191
S05	Y	Y	Y	N	N	284	255	222	11	11	16	36	273	273	239	186
S06	Y	Y	Y	N	N	856	868	791	18	12	18	40	838	844	850	751
S07	Y	Y	Y	Y	Y	268	293	292	42	42	12	29	226	226	281	263
S08	Y	Y	Y	N	N	3400	464	405	29	29	149	357	3371	3371	315	48
S09	Y	Y	Y	N	N	326	394	359	12	12	14	33	314	314	380	326
S10	Y	Y	Y	N	N	919	843	843	0	0	47	108	919	919	796	735
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	125	107	158	157	9	21	67	68	116	86
TOTAL	49	35	32	14	15	32677	28657	25332	17955	9371	16671	31280	14722	23306	11986	(5948)

TABLE 3-82
ALTERNATIVE C: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

									Harvest							
				Ferry &		Modeled			Total	Sub	Projected		Change			
	Sub		Future	Vehicle	Com	Harvest	Population		Harv.	Harv.	Harv.	Harv.	Total	Sub	Sub	Sub
Geozone	Use	Roads	Develop	Access	Access	87-88	2000	2040	87-88	87-88	2000	2040	87-88	87-88	2000	2040
#	Y, N	Y, N, T	Y, N	Y, N	Y, N	#	#	#	#	#	#	#	#	#	#	#
C01	Y	T	Y	Y	Y	264	239	239	421	163	281	517	(157)	101	(42)	(278)
C02	Y	Y	Y	Y	Y	963	1072	989	1769	998	1413	2598	(806)	(35)	(341)	(1609)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	148	76	241	63	62	115	(121)	57	86	(39)
C05	Y	Y	Y	N	N	167	129	128	726	582	384	707	(559)	(415)	(255)	(579)
C06	Y	Y	Y	N	Y	824	554	504	1092	336	745	1370	(268)	488	(191)	(866)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	239	225	807	711	1058	1944	(421)	(325)	(819)	(1719)
C10	Y	Y	Y	Y	Y	1263	1285	1281	3310	3140	3425	6296	(2047)	(1877)	(2140)	(5015)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	139	876	16	962	1767	(573)	287	(636)	(1628)
C21	Y	Y	Y	Y	Y	175	200	161	287	5	41	69	(112)	170	159	92
C22	Y	Y	Y	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	4	0	6	6	196	332	80	80	(192)	(332)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1278	359	3	42	74	920	1276	1236	1204
K05	Y	N	Y	N	N	614	690	622	231	18	9	18	383	596	681	604
K06	Y	Y	Y	Y	Y	2758	2532	1838	2253	808	503	1020	505	1950	2029	818
K07	Y	N	Y	N	N	1377	1008	708	116	14	110	224	1261	1363	898	484
K08	Y	Y	Y	Y	Y	1544	1379	877	310	127	312	632	1234	1417	1067	245
K09	Y	Y	Y	N	N	1085	1184	709	51	36	324	656	1034	1049	860	53
K10	Y	T	Y	N	N	826	880	557	11	11	574	1162	815	815	306	(605)
K11	Y	Y	Y	Y	Y	1734	1458	952	512	232	378	766	1222	1502	1080	186
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1217	791	0	0	65	151	1328	1328	1152	640
S02	Y	N	Y	N	N	1053	937	855	0	0	53	122	1053	1053	884	733
S03	Y	Y	Y	Y	Y	591	718	709	6	6	28	65	585	585	690	644
S04	Y	Y	Y	Y	Y	295	286	192	5	0	8	36	290	295	278	156
S05	Y	Y	Y	N	N	284	239	208	11	11	16	36	273	273	223	172
S06	Y	Y	Y	N	N	856	716	643	18	12	18	40	838	844	698	603
S07	Y	Y	Y	Y	Y	268	293	290	42	42	12	29	226	226	281	261
S08	Y	Y	Y	N	N	3400	464	311	29	29	149	357	3371	3371	315	(46)
S09	Y	Y	Y	N	N	326	394	255	12	12	14	33	314	314	380	222
S10	Y	Y	Y	N	N	919	843	829	0	0	47	108	919	919	796	721
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	119	100	158	157	9	21	67	68	110	79
TOTAL	49	35	34	14	15	32677	28229	23864	17955	9371	16671	31280	14722	23306	11558	(7416)

TABLE 3-83
ALTERNATIVE D: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

Geozone #	Sub Use Y, N	Roads Y, N, T	Future Develop Y, N	Ferry & Vehicle Access Y, N	Com Access Y, N	Modeled Harvest 87-88 #	Modeled Population 2000 #	Modeled Population 2040 #	Harvest Total Harv. 87-88 #	Harvest Sub Harv. 87-88 #	Harvest Projected Harv. 2000 #	Harvest Projected Harv. 2040 #	Change Total 87-88 #	Change Sub 87-88 #	Change Sub 2000 #	Change Sub 2040 #
C01	Y	T	Y	Y	Y	264	239	239	421	163	281	517	(157)	101	(42)	(278)
C02	Y	Y	Y	Y	Y	963	1072	883	1769	998	1413	2598	(806)	(35)	(341)	(1715)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	148	106	241	63	62	115	(121)	57	86	(9)
C05	Y	Y	N	N	N	167	129	125	726	582	384	707	(559)	(415)	(255)	(582)
C06	Y	Y	Y	N	Y	824	554	351	1092	336	745	1370	(268)	488	(191)	(1019)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	239	225	807	711	1058	1944	(421)	(325)	(819)	(1719)
C10	Y	Y	Y	Y	Y	1263	1285	1281	3310	3140	3425	6296	(2047)	(1877)	(2140)	(5015)
C11	Y	N	Y	N	N	179	111	95	108	81	361	663	71	98	(250)	(568)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	4	8	0	0	3	28	36	5	1
C20	Y	T	Y	N	N	303	326	232	876	16	962	1767	(573)	287	(636)	(1535)
C21	Y	Y	N	Y	Y	175	200	177	287	5	41	69	(112)	170	159	108
C22	Y	Y	Y	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	4	0	6	6	196	332	80	80	(192)	(332)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1169	359	3	42	74	920	1276	1236	1095
K05	Y	N	Y	N	N	614	690	631	231	18	9	18	383	596	681	613
K06	Y	Y	Y	Y	Y	2758	2389	1492	2253	808	503	1020	505	1950	1886	472
K07	Y	N	Y	N	N	1377	994	632	116	14	110	224	1261	1363	884	408
K08	Y	Y	Y	Y	Y	1544	1476	1127	310	127	312	632	1234	1417	1164	495
K09	Y	Y	Y	N	N	1085	1184	780	51	36	324	656	1034	1049	860	124
K10	Y	T	Y	N	N	826	881	748	11	11	574	1162	815	815	307	(414)
K11	Y	Y	Y	Y	Y	1734	1458	928	512	232	378	766	1222	1502	1080	162
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1223	686	0	0	65	151	1328	1328	1158	535
S02	Y	N	Y	N	N	1053	928	772	0	0	53	122	1053	1053	875	650
S03	Y	Y	Y	Y	Y	591	718	659	6	6	28	65	585	585	690	594
S04	Y	Y	Y	Y	Y	295	240	155	5	0	8	36	290	295	232	119
S05	Y	Y	Y	N	N	284	236	171	11	11	16	36	273	273	220	135
S06	Y	Y	Y	N	N	856	730	514	18	12	18	40	838	844	712	474
S07	Y	Y	Y	Y	Y	268	293	186	42	42	12	29	226	226	281	157
S08	Y	Y	Y	N	N	3400	400	339	29	29	149	357	3371	3371	251	(18)
S09	Y	Y	Y	N	N	326	352	296	12	12	14	33	314	314	338	263
S10	Y	Y	Y	N	N	919	843	823	0	0	47	108	919	919	796	715
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	144	127	158	157	9	21	67	68	135	106
TOTAL	49	35	33	14	15	32677	28051	23235	17955	9371	16671	31280	14722	23306	11380	(8045)

TABLE 3-84
ALTERNATIVE E: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

										Harvest						
				Ferry &		Modeled			Total	Sub	Projected		Change			
	Sub		Future	Vehicle	Com	Harvest	Population		Harv.	Harv.	Harv.	Harv.	Total	Sub	Sub	Sub
Geozone	Use	Roads	Develop	Access	Access	87-88	2000	2040	87-88	87-88	2000	2040	87-88	87-88	2000	2040
#	Y, N	Y, N, T	Y, N	Y, N	Y, N	#	#	#	#	#	#	#	#	#	#	#
C01	Y	T	Y	Y	Y	264	239	239	421	163	281	517	(157)	101	(42)	(278)
C02	Y	Y	Y	Y	Y	963	1122	1121	1769	998	1413	2598	(806)	(35)	(291)	(1477)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	145	144	241	63	62	115	(121)	57	83	29
C05	Y	Y	N	N	N	167	129	129	726	582	384	707	(559)	(415)	(255)	(578)
C06	Y	Y	Y	N	Y	824	574	573	1092	336	745	1370	(268)	488	(171)	(797)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	262	262	807	711	1058	1944	(421)	(325)	(796)	(1682)
C10	Y	Y	Y	Y	Y	1263	1391	1391	3310	3140	3425	6296	(2047)	(1877)	(2034)	(4905)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	283	876	16	962	1767	(573)	287	(636)	(1484)
C21	Y	Y	Y	Y	Y	175	200	200	287	5	41	69	(112)	170	159	131
C22	Y	Y	Y	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	2	1	6	6	196	332	80	80	(194)	(331)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1278	359	3	42	74	920	1276	1236	1204
K05	Y	N	Y	N	N	614	690	690	231	18	9	18	383	596	681	672
K06	Y	Y	Y	Y	Y	2758	2647	1797	2253	808	503	1020	505	1950	2144	777
K07	Y	N	Y	N	N	1377	1008	710	116	14	110	224	1261	1363	898	486
K08	Y	Y	Y	Y	Y	1544	1424	1014	310	127	312	632	1234	1417	1112	382
K09	Y	Y	Y	N	N	1085	1184	1155	51	36	324	656	1034	1049	860	499
K10	Y	T	N	N	N	826	894	894	11	11	574	1162	815	815	320	(268)
K11	Y	Y	Y	Y	Y	1734	1458	1220	512	232	378	766	1222	1502	1080	454
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1291	1007	0	0	65	151	1328	1328	1226	856
S02	Y	N	N	N	N	1053	1092	1092	0	0	53	122	1053	1053	1039	970
S03	Y	Y	Y	Y	Y	591	718	709	6	6	28	65	585	585	690	644
S04	Y	Y	Y	Y	Y	295	330	244	5	0	8	36	290	295	322	208
S05	Y	Y	Y	N	N	284	239	208	11	11	16	36	273	273	223	172
S06	Y	Y	Y	N	N	856	716	643	18	12	18	40	838	844	698	603
S07	Y	Y	Y	Y	Y	268	293	290	42	42	12	29	226	226	281	261
S08	Y	Y	Y	N	N	3400	464	312	29	29	149	357	3371	3371	315	(45)
S09	Y	Y	Y	N	N	326	371	273	12	12	14	33	314	314	357	240
S10	Y	Y	Y	N	N	919	843	843	0	0	47	108	919	919	796	735
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	N	N	N	225	197	185	158	157	9	21	67	68	188	164
TOTAL	49	35	30	14	15	32677	28925	26305	17955	9371	16671	31280	14722	23306	12254	(4975)

TABLE 3-85
ALTERNATIVE F: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

Geozone #	Sub Use Y, N	Roads Y, N, T	Future Develop Y, N	Ferry & Vehicle Access Y, N	Com Access Y, N	Modeled Harvest 87-88 #	Modeled Population 2000 #	Modeled Population 2040 #	Harvest Total Harv. 87-88 #	Harvest Sub Harv. 87-88 #	Harvest Projected Harv. 2000 #	Harvest Projected Harv. 2040 #	Change Total 87-88 #	Change Sub 87-88 #	Change Sub 2000 #	Change Sub 2040 #
C01	Y	T	N	Y	Y	264	239	239	421	163	281	517	(157)	101	(42)	(278)
C02	Y	Y	Y	Y	Y	963	1072	797	1769	998	1413	2598	(806)	(35)	(341)	(1801)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	148	76	241	63	62	115	(121)	57	86	(39)
C05	Y	Y	Y	N	N	167	129	126	726	582	384	707	(559)	(415)	(255)	(581)
C06	Y	Y	Y	N	Y	824	556	465	1092	336	745	1370	(268)	488	(189)	(905)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	239	225	807	711	1058	1944	(421)	(325)	(819)	(1719)
C10	Y	Y	Y	Y	Y	1263	1285	1281	3310	3140	3425	6296	(2047)	(1877)	(2140)	(5015)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	180	876	16	962	1767	(573)	287	(636)	(1587)
C21	Y	Y	Y	Y	Y	175	200	167	287	5	41	69	(112)	170	159	98
C22	Y	Y	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	4	1	6	6	196	332	80	80	(192)	(331)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1278	359	3	42	74	920	1276	1236	1204
K05	Y	N	Y	N	N	614	690	620	231	18	9	18	383	596	681	602
K06	Y	Y	Y	Y	Y	2758	2623	1810	2253	808	503	1020	505	1950	2120	790
K07	Y	N	Y	N	N	1377	1095	710	116	14	110	224	1261	1363	985	486
K08	Y	Y	Y	Y	Y	1544	1228	946	310	127	312	632	1234	1417	916	314
K09	Y	Y	Y	N	N	1085	1184	706	51	36	324	656	1034	1049	860	50
K10	Y	T	Y	N	N	826	894	870	11	11	574	1162	815	815	320	(292)
K11	Y	Y	Y	Y	Y	1734	1458	1012	512	232	378	766	1222	1502	1080	246
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1234	939	0	0	65	151	1328	1328	1169	788
S02	Y	N	Y	N	N	1053	937	856	0	0	53	122	1053	1053	884	734
S03	Y	Y	Y	Y	Y	591	718	709	6	6	28	65	585	585	690	644
S04	Y	Y	Y	Y	Y	295	338	311	5	0	8	36	290	295	330	275
S05	Y	Y	Y	N	N	284	239	208	11	11	16	36	273	273	223	172
S06	Y	Y	Y	N	N	856	792	642	18	12	18	40	838	844	774	602
S07	Y	Y	Y	Y	Y	268	293	290	42	42	12	29	226	226	281	261
S08	Y	Y	Y	N	N	3400	464	312	29	29	149	357	3371	3371	315	(45)
S09	Y	Y	Y	N	N	326	394	265	12	12	14	33	314	314	380	232
S10	Y	Y	Y	N	N	919	843	843	0	0	47	108	919	919	796	735
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	114	95	158	157	9	21	67	68	105	74
TOTAL	49	35	32	14	15	32677	28412	24377	17955	9371	16671	31280	14722	23306	11741	(6903)

TABLE 3-86
ALTERNATIVE G: DEER-ACCESS, ABUNDANCE/DISTRIBUTION AND COMPETITION

										Harvest						
				Ferry &			Modeled		Total	Sub	Projected			Change		
	Sub		Future	Vehicle	Com	Harvest	Population		Harv.	Harv.	Harv.	Harv.	Total	Sub	Sub	Sub
Geozone	Use	Roads	Develop	Access	Access	87-88	2000	2040	87-88	87-88	2000	2040	87-88	87-88	2000	2040
#	Y, N	Y, N, T	Y, N	Y, N	Y, N	#	#	#	#	#	#	#	#	#	#	#
C01	Y	T	N	Y	Y	264	239	239	421	163	281	517	(157)	101	(43)	(279)
C02	Y	Y	Y	Y	Y	963	1072	797	1769	998	1413	2598	(806)	(35)	(341)	(1801)
C03	Y	N	N	N	N	205	203	203	140	68	235	433	65	137	(32)	(230)
C04	Y	Y	Y	Y	Y	120	148	76	241	63	62	115	(121)	57	86	(39)
C05	Y	Y	Y	N	N	167	129	127	726	582	384	707	(559)	(415)	(255)	(580)
C06	Y	Y	Y	N	Y	824	554	467	1092	336	745	1370	(268)	488	(191)	(903)
C07	Y	N	N	N	N	36	48	48	82	40	60	110	(46)	(4)	(12)	(62)
C09	Y	Y	Y	N	N	386	239	225	807	711	1058	1944	(421)	(325)	(819)	(1719)
C10	Y	Y	Y	Y	Y	1263	1285	1281	3310	3140	3425	6296	(2047)	(1877)	(2140)	(5015)
C11	Y	N	N	N	N	179	111	111	108	81	361	663	71	98	(250)	(552)
C12	Y	N	N	N	N	548	556	556	593	346	837	1537	(45)	202	(281)	(981)
C13	Y	N	N	N	N	242	241	241	299	251	606	1113	(57)	(9)	(365)	(872)
C14	N	N	N	N	N	0	0	0	13	0	0	0	(13)	0	0	0
C15	Y	Y	N	Y	N	3072	3187	3187	2888	972	2942	5408	184	2100	245	(2221)
C16	N	T	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C17	Y	N	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C18	Y	Y	Y	N	N	36	5	5	8	0	0	3	28	36	5	2
C20	Y	T	Y	N	N	303	326	220	876	16	962	1767	(573)	287	(636)	(1547)
C21	Y	Y	Y	Y	Y	175	200	165	287	5	41	69	(112)	170	159	96
C22	Y	Y	N	N	N	0	0	0	0	0	0	0	0	0	0	0
C23	Y	Y	Y	N	N	52	12	12	22	5	17	29	30	47	(5)	(17)
C24	Y	Y	Y	N	Y	0	0	0	0	0	0	0	0	0	0	0
C25	Y	T	Y	N	N	86	4	0	6	6	196	332	80	80	(192)	(332)
K01	Y	Y	Y	Y	Y	0	0	0	0	0	0	0	0	0	0	0
K02	Y	N	N	N	N	289	259	259	25	19	78	138	264	270	181	121
K04	Y	Y	Y	Y	Y	1279	1278	1278	359	3	42	74	920	1276	1236	1204
K05	Y	N	Y	N	N	614	690	670	231	18	9	18	383	596	681	652
K06	Y	Y	Y	Y	Y	2758	2615	1786	2253	808	503	1020	505	1950	2112	766
K07	Y	N	Y	N	N	1377	1034	710	116	14	110	224	1261	1363	924	486
K08	Y	Y	Y	Y	Y	1544	1295	911	310	127	312	632	1234	1417	983	279
K09	Y	Y	Y	N	N	1085	1184	745	51	36	324	656	1034	1049	860	89
K10	Y	T	Y	N	N	826	894	870	11	11	574	1162	815	815	320	(292)
K11	Y	Y	Y	Y	Y	1734	1458	952	512	232	378	766	1222	1502	1080	186
K12	Y	N	N	N	N	79	114	114	16	0	0	0	63	79	114	114
K13	Y	N	N	N	N	1168	1182	1182	46	0	0	0	1122	1168	1182	1182
K14	Y	N	N	N	N	502	508	508	5	0	50	75	497	502	458	433
K15	Y	N	N	N	N	333	339	339	16	16	215	436	317	317	124	(97)
S01	Y	Y	Y	N	N	1328	1234	926	0	0	65	151	1328	1328	1169	775
S02	Y	N	Y	N	N	1053	937	872	0	0	53	122	1053	1053	884	750
S03	Y	Y	Y	Y	Y	591	718	709	6	6	28	65	585	585	690	644
S04	Y	Y	Y	Y	Y	295	338	311	5	0	8	36	290	295	330	275
S05	Y	Y	Y	N	N	284	239	208	11	11	16	36	273	273	223	172
S06	Y	Y	Y	N	N	856	792	642	18	12	18	40	838	844	774	602
S07	Y	Y	Y	Y	Y	268	293	290	42	42	12	29	226	226	281	261
S08	Y	Y	Y	N	N	3400	464	312	29	29	149	357	3371	3371	315	(45)
S09	Y	Y	Y	N	N	326	394	265	12	12	14	33	314	314	380	232
S10	Y	Y	Y	N	N	919	843	843	0	0	47	108	919	919	796	735
S11	Y	N	N	N	N	368	377	377	0	0	19	42	368	368	358	335
S12	Y	Y	N	N	N	212	213	213	35	35	10	21	177	177	203	192
S13	Y	T	N	N	N	43	43	43	0	0	3	7	43	43	40	36
S14	Y	Y	Y	N	N	225	114	95	158	157	9	21	67	68	105	74
TOTAL	49	35	32	14	15	32677	28406	24389	17955	9371	16671	31280	14722	23306	11735	(6891)

Current subsistence deer harvest exceeds the sustainable long-term abundance (abundance is defined as ample deer available for harvest) levels in Geozones C02, C05, C07, C09, C10 and C13 (all Geozones listed are in Alaska Department of Fish and Game Management Unit (GMU) 4). Current deer harvest for all uses exceeds the sustainable long-term levels in Geozones C01, C02, C04, C05, C06, C07, C09, C10, C12, C13, C14, C20, and C21 (all Geozones listed are in GMU 4 with exception of C14 "Endicott Wilderness" and C21 "Juneau Urban Area" which is in Game Management Unit 1C). Of particular concern are harvests displayed for Geozones C01 (Pelican), C07 (Pleasant Island), C11 (South Baranof Roadless Area), C12-14 (West Chichagof, South Baranof, Endicott Wilderness), and C20 (Mansfield Peninsula). All of these Geozones fall within Game Management Unit 4 and have had minimal, if any, development related to timber harvest. All are showing harvest of deer in excess of modeled capability. Data is displayed for a harvestable population of ten percent (Flynn, 1989) over the projected winter population of deer plus the fawn crop in each Geozone based on habitat capability modeling. The analysis assumes actual deer harvest for 1988 reflects rural and non-rural demand for deer. Based on this assumption, the current demand for deer by rural and non-rural communities exceeds the sustainable supply of deer for the Geozones listed.

In March 1988, Management Summary and Recommendations for Game Management Unit 4 (GMU 4) were (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1986-30 June 1987):

> Mild wintering conditions during recent years have been favorable for overwinter survival. This suggests that the deer population in Unit (GMU) 4 may be near all-time-high densities. Harvest levels and pellet group densities support this assumption. Current hunting regulations are quite liberal. The Department has attempted to enhance the public's awareness of the magnitude and dynamic nature of the deer population in Unit 4. A strong public demand for increased opportunities for consumptive use has been expressed. The demand has been accommodated through Game Board action that will become effective in regulatory year 1987-88: bag limit was increased to six deer for all hunters, the season was extended to the end of January for subsistence hunters, and all others will be able to hunt until 7 January.

In May 1989, Management Summary and Recommendations for Game Management Unit 4 were (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June 1988):

> The population objectives for Unit 4 are to maintain a population density capable of sustaining an average harvest of at least 1.5 deer/hunter with a hunting effort of no more than 4 days per deer and to maintain the

male deer component of the harvest at a minimum of 60 percent. All 3 objectives were achieved during 1987. The average harvest was 2.4 deer/hunter; hunting effort was 2.8 days/deer. The male deer component of the harvest was 72 percent. The number of hunters increased by 4 percent, while the number of deer harvested increased 39 percent over the 1986-87 harvest.

Extrapolation of reports from deer hunters in Unit 4 indicated an estimated harvest of 14,430 deer during the 1987-88 season. Seventy-four percent of the hunters were successful. The winter was mild, and the 6-month season allowed hunters to select optimum weather conditions. Spring pellet group count results indicate that the deer population continues to be high, compared with other sampled areas in Southeast Alaska. Some areas near communities have low deer populations, but individual seasons and bag limits for these small areas are not recommended. Should restrictive measures be required to reduce the harvest, I (E. L. Young, Alaska Department of Fish and Game) recommend shortening the season by eliminating January and a portion of December.

Harvest in excess of production levels in the Geozones identified above can be explained in part by: (1) mild winters in the past ten years have allowed deer populations to build in excess of the available habitat allowing overharvest to occur; (2) harvestable populations of 10 percent of the total projected herd size may be too conservative for actual usage estimates; (3) harvest is not known in most wildlife analysis areas until sometime after the season is over, making regulations of the harvest level impossible during the harvest season; and (4) population estimates based on the habitat capability model may not be exactly representative of site specific conditions.

According to Alaska Department of Fish and Game Harvest Records and the Revision Deer Habitat Capability Model, the remaining Geozones (Game Management Units 1A, 1B, 1D, 2, 3 and 5) for 1988 were harvested at or below sustainable long-term abundance levels. At this point in time, if no other changes occur on the land base and weather patterns remain constant, deer herds would be expected to at least maintain at present levels.

In all alternatives, existing Wilderness designations would not be affected by development activities with the exception of those associated with existing mineral rights (i.e., Greens Creek development on Admiralty National Monument 'C15 and C20' and the Quartz Hill mineral development in Misty Fiords National Monument 'K13'). Development from both operations is confined to minimal acreage and have been mitigated to reflect concerns for wildlife populations. In the case of Misty Fiords (K13), no subsistence deer harvest has occurred (ADF&G 1988 Deer Harvest Records). On the Admiralty National Monument (C15),

subsistence harvest of deer accounted for about 31 percent of the harvestable population estimate.

In ADF&G Wildlife Analysis Areas (WAA's) 3836 and 3837, the location of the Greens Creek venture, total deer harvested by both rural and non-rural residents was 447. Deer harvested in these two Wildlife Analysis Areas is a result of hunters from surrounding communities (Juneau, Angoon, Hoonah, Haines, etc.) and not the Greens Creek Mine employees. Company policy does not allow the hunting of game while employees are on shift or associated with the mining activity. Of the total deer harvested in WAA's 3836 and 3837, Geozone C15 (the Green's Creek area) accounted for nearly 18 percent. Forest-wide, the existing Wilderness designations occur in Geozones C03, C12, C13, C14, C15, C16, C17, K13, K14, K15, S11, S12, and S13. The remaining 38 Geozones would be affected by the amount of development, the reduction of habitat to maintain deer herds and harvest regulations.

Future 10 and 50-year projections indicate that Alternative A best meets the demand for subsistence purposes. This takes into account modeled herd changes due to habitat loss from likely future development activities, projected increases in rural and non-rural resident populations anticipated for all of Southeast Alaska, and assumes all land management prescriptions designated in a category of development are, in fact, developed to the prescribed extent practicable. Geozones K10 and K15 as well as most Geozones within the Chatham Area indicate harvest in excess of supply available. Forest-wide, approximately 3,600 animals less than the predicted 2040 demand, may be maintained from the available habitat for subsistence use of the resources. Due primarily to vegetation alterations and based on current harvest regulations, Alternative D would produce fewer deer with more concentrated populations. Alternatives E, B, G, F, and C respectively fall within the range set by Alternatives A and D.

For subsistence deer harvest purposes, Alternative A has the potential to best meet the need of the rural communities. In this Alternative, based on the total recreation and subsistence takes, Geozones C01, C02, C04, C05, C06, C07, C09, C10, C12, C13, C14, C20, and C21 were overharvested during the 1987-88 hunting season. Geozones C02, C05, C07, C09, C10 and C13 were overharvested solely considering subsistence use.

Geozones C12, C13 and C14 are designated wilderness where development has not taken place. Geozones C01, C04, C07, C10, C20 and C21 are located immediately adjacent to the communities of Pelican, Tenakee Springs, Gustavus, Sitka, and Juneau (C20 and C21) respectively. The remainder of the Geozones (C02, C05, C06, and C09) are within the Alaska Pulp Corporation Long-Term Sale Area where timber harvest and roading have taken place.

Based on the length of deer harvest season in Game Management Unit 4, liberal bag limits, access from communities linked to the Alaska Marine Highway System, higher proportion of deer harvest from non-rural residents than rural residents, reduction of habitat in some areas of use, probable overharvest of deer adjacent to communities, and increased demand for deer by both rural and non-rural residents, populations of deer in Game Management Unit 4 are subject to declines given present regulations and in the advent of a severe winter. Subsistence use of the resource is presently being impacted and subject to potential further impact should additional development occur and current regulations be maintained.

Based on data available for analysis, a significant possibility of a significant restriction of subsistence use of deer exists in Geozones C01, C02, C03, C04, C05, C06, C07, C09, C10, C11, C12, C13, C15, C20, C23, C25, K10, K15 and S08. This finding is relevant given current harvest regulations provided by the Alaska Department of Fish and Game for rural and non-rural uses of the resources under current capability and harvest averages for the 1987-88 hunting season.

Moose. "Land mammals other than deer" account for approximately 4 percent of the total harvest of edible subsistence resources (Kruse and Muth, 1989). The only communities where presently at least 30 percent of the households harvested land mammals other than deer in 1987 were Edna Bay, North Whale Pass, Thorne Bay, and Meyers Chuck. Residents of these communities harvested moose, black bear, or furbearers (Kruse and Muth, 1989).

Moose are not widespread on the Tongass. Table 3-87 displays the occurrence of natural and planted moose herds. Moose in Berners Bay (Geozone C23) are the only existing herd that were planted successfully in Southeast Alaska. Moose were also transplanted into the Chickamin River Valley (Geozone K13), but due to limited habitat, this herd never became established (USFS, Analysis of the Management Situation, Wildlife, page 3-645).

TABLE 3-87
MOOSE DISTRIBUTION AND HARVEST

GMU[1]	Geozone[2]	TLMP LUD 1-4[3]	Subsistence Priority[4]	Residents of Rural Community[5]	Open to Sport Harvest[6]	Change in Allocation From Revision Alternatives[7]						
						A	B	C	D	E	F	G
1C	C14	1	No	-	Reg	N	N	N	N	N	N	N
1D	C16	1	Yes	1D Residents	Reg	N	N	N	N	N	N	N
5	C17	1	Yes	Yakutat	Reg	N	N	N	N	N	N	N
1C	C18	3	No	-	Reg	X	N	N	N	N	N	N
1C	C21	3	No	-	Reg	X	L	N	X	N	N	N
5	C22	1R	Yes	Yakutat	Reg	X	X	N	L	X	X	X
1C/D	C23	2-4	N/Y	1D Residents	Reg	X	X	N	L	X	X	X
5	C24	2-4	Yes	Yakutat	Reg	X	X	N	L	N	N	N
1C	C25	3-4	No	-	Reg	X	X	N	L	X	X	X
1A	K13	1	No	-	Yes	N	N	N	N	N	N	N
3	S03	3-4	No	-	No	X	X	N	L	N	N	N
3	S04	3-4	No	-	No	X	X	N	L	N	N	N
3	S06	3-4	No	-	No	X	L	N	L	X	N	N
3	S07	3-4	No	-	No	X	X	N	L	N	N	N
1B	S08	1R-4	No	-	Reg	X	X	N	L	N	N	N
1B	S09	2-4	No	-	Reg	X	X	N	L	N	N	N
3	S10	3-4	No	-	No	X	X	N	L	X	N	N
1B	S12	1	Yes	Wrangell	Reg	N	N	N	N	N	N	N
3	S13	1-4	No	-	No	X	X	N	L	N	N	N

Source: Alaska Game Regulations, July 1, 1989-June 30, 1990, No. 30
Revision Database, 2/90
Revision DEIS Alternative Maps A-G

[1]Alaska Department of Fish and Game Management Unit (GMU)
[2]Geozone-planning unit established for the Revision DEIS
[3]Tongass Land Management Plan Land Use Designation (LUD) 1-4. 1R identifies portions of the Forest that were released from wilderness designation and never assigned a new LUD value.
[4]Subsistence harvest specified in the Alaska Game Regulations, July 1, 1989
[5]Rural community (residents) specified by Alaska Game Regulations as having priority use of the resources contained within the Game Management Unit
[6]Registration or permits required for all sport hunting of moose in Southeast with the exception of GMU 1A and 1B south of LeConte Glacier
[7]Change in land allocations from the existing Forest Plan between Alternatives presented in the Revision DEIS. N=no change from current, X=more restrictive than current and L=less restrictive than current

Forest-wide, nineteen of the fifty-one Geozones sustain moose populations. Of the nineteen Geozones occupied by moose, thirteen allow both subsistence and sport use. The remaining six Geozones allowed no harvest during the 1989-1990 season due to the low number of animals in these areas.

Five of the thirteen Geozones (C14, C16, C17, K13, and S12) allowing moose harvest are located within designated wilderness (Revision Database, 2/90). Moose harvest during the 1989-1990 season from these areas contributed an estimated 40 animals (28 percent of the total animals harvest) of the total 142 taken from the Tongass National Forest (ADF&G, Southeast Alaska Wildlife News, 2/90). Due to these Geozones being designated wilderness, no impacts associated with development are expected to occur in any of the alternatives.

The remaining eight Geozones (C18, C21, C22, C23, C24, C25, S08, and S09) allow subsistence as well as sport harvest to occur with Geozones C22, C23, and C24 giving priority to subsistence users in the rural communities associated with Game Management Unit 1D, and Yakutat. These eight Geozones are contained within the State's Game Management Units 1B, 1C, 1D, and 5. These Game Management Units contributed an estimated 102 animals (72 percent) of the total moose harvested during 1989-90 hunting season (ADF&G, Southeast Alaska Fish and Wildlife News, 1990). All Game Management Units have experienced timber harvest with Units 1B, 1C, and 1D also having had extensive mineral activities in them since the turn of the century.

The ANILCA Section 813, 1987 report to Congress states (page IV-34) that moose populations in Game Management Units 1B, 1C, 1D and 5 are stable, high, stable and high respectively. Populations trends in 1C and 5 are predicted to be increasing, while populations trends in 1B and 1D are stable. Moose harvest for Game Management Units 1 and 5 was 111 and 61 animals respectively for a total of 172 animals for the 1987-88 hunting season (USDI, Subsistence Management and Use, 1988). Subtracting the number of moose killed on state land around the communities of Haines, Skagway and Klukwan, a similar harvest in the 1987-88 and 1989-90 periods of about 140-150 animals was attained. Populations for the Game Management Units 1 and 5 for 1988 was estimated at 1,910 animals. Given the ten percent harvest allowance of the Alaska Department of Game and Fish (Flynn, 1989) harvest displayed in the 1987 Report to Congress and the preliminary harvest statistics for the 1989-90 Southeast Alaska Fish and Wildlife News (February, 1990), was at a level that could be maintained into the foreseeable future without further limiting non-rural use to provide for subsistence qualified harvest.

Moose have been in Southeast Alaska for a short period of time. They have migrated down major river systems from Canada into Southeast during the early part of the twentieth century with moose first being reported in the Yakutat (Game Management Unit 5) area between 1930 and 1932. Given the short time

they have been in Southeast Alaska, their distribution and populations will probably increase in the foreseeable future (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-645).

A moose habitat capability model was not developed for the Revision DEIS, therefore, estimates of habitat capability on the Tongass are not available. Due to the steady increase in distribution across the Tongass (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-645), it is expected that moose have not occupied all areas capable of supporting them. In the case of the Yakutat Forelands, capability may be declining due to the successional stages of spruce and hemlock taking over some of the willow and alder stands which at present are important overwintering habitats for moose. For analysis of effects in all Alternatives in the Revision DEIS, moose habitat is assumed to remain steady, with minimum impact by timber harvest activities on areas prescribed for timber harvest (ADF&G, Division of Wildlife Conservation, Moose, 1988).

Abundance and distribution of moose across the Forest is best met by Alternative A, due primarily to less roading and influx of people associated with it. Timber harvest has been shown to increase moose populations. Alternative D would best provide this action. However, influx of people, heavy regrowth, concentrated animal movements and lack of habitat to sustain overwintering herds appears to balance increases in moose populations due to greater forage production in harvested stands (ADF&G, Division of Wildlife Conservation, Moose, 1988). Alternatives E, B, F, G, and C respectively fall within the range set by Alternatives A and D.

Based on data available for analysis, it is unlikely that future development activities would lead to a significant possibility of a significant restriction of subsistence use of moose.

Mountain Goat. Historically, mountain goats in Southeast Alaska were present only on the mainland. Although capable of swimming, they did not naturally disperse from the mainland to the islands. Through cooperative transplant work between the Alaska Department of Fish and Game and the U.S. Forest Service, mountain goats are now present on many islands in Southeast Alaska. Table 3-88 displays the Geozones where mountain goats are located and where subsistence priority use for the resource exists.

In terms of subsistence harvest of the resource, mountain goats are considered in the Tongass Resource Use Cooperative Survey as "Land Mammals other than Deer." This category accounts for 4 percent of the total subsistence harvest recorded (Kruse and Muth, 1989). Moose meat and black bear meat make up the majority of "Land Mammals Other than Deer" with moose comprising most of the harvest. Mountain goat comprises a very small percentage of this harvest as well as the total subsistence harvest.

TABLE 3-88
MOUNTAIN GOAT DISTRIBUTION AND HARVEST

GMU[1]	Geozone[2]	TLMP LUD 1-4[3]	Subsistence Priority[4]	Residents of Rural Community[5]	Open to Sport Harvest[6]	Change in Allocation From Revision Alternatives[7]						
						A	B	C	D	E	F	G
4	C09	1	No	-	Reg	N	N	N	N	N	N	N
4	C10	3-4	No	-	Reg	X	X	N	L	N	N	N
4	C13	1	No	-	Reg	N	N	N	N	N	N	N
1C	C14	1	Yes	HA KL HN[8]	Reg	N	N	N	N	N	N	N
1D	C16	1	No	-	No	N	N	N	N	N	N	N
5	C17	1	No	-	Reg	N	N	N	N	N	N	N
1C	C18	3	Yes	HA KL HN[8]	Reg	X	N	N	N	N	N	N
5	C22	1R	No	-	Reg	X	X	N	L	X	X	X
1C/D	C23	2-4	Y/N	HA KL HN[8]	RG/No	X	X	N	L	X	X	X
1C	C25	3-4	Yes	HA KL HN[8]	Reg	X	X	N	L	X	X	X
1A	K04	2-4	No	-	No	X	N	N	L	X	N	N
1A/B	K05	3-4	No	-	RG/No	X	X	N	N	N	N	N
1A	K12	2	No	-	No	N	N	N	N	N	N	N
1A	K13	1	No	-	No	N	N	N	N	N	N	N
1B	S08	1R-4	No	-	Reg	X	X	N	L	N	N	N
1B	S09	2-4	No	-	Reg	X	X	N	L	N	N	N

Source: Alaska Game Regulations, July 1, 1989-June 30, 1990, No. 30
Revision Database, 2/90
Revision DEIS Alternative Maps A-G
[1]Alaska Department of Fish and Game Management Unit (GMU)
[2]Geozone-planning unit established for the Revision DEIS
[3]Tongass Land Management Plan Land Use Designation (LUD) 1-4. 1R identifies portions of the Forest that were released from wilderness designation and never assigned a new LUD value.
[4]Subsistence harvest specified in the Alaska Game Regulations, July 1, 1989
[5]Rural community (residents) specified by Alaska Game Regulations as having priority use of the resources contained within the Game Management Unit
[6]Registration or permits required for all sport hunting of mountain goat in Southeast
[7]Change in land allocations from the existing Forest Plan between Alternatives presented in the Revision DEIS. N=no change from current, X=more restrictive than current and L=less restrictive than current
[8]HA=Haines, KL=Klukwan, and HN=Hoonah

Sixteen Geozones out of the total of fifty-one on the Tongass contain populations of mountain goat (Analysis of the Management Situation, Wildlife, page 3-579 and Table 3-88. Of the sixteen Geozones with mountain goat populations, six (C09, C13, C14, C16, C17 and K13) are in designated wilderness and will not be changed in any of the Revision's alternatives.

Two (K04 and K12) of the remaining ten Geozones outside designated wilderness do not allow sport or subsistence use of mountain goat. These two Geozones, located in Game Management Unit 1A, have been reported to contain moderate to high mountain goat populations with increasing numbers projected (USDI, Subsistence Management and Use, 1988). Both areas may be opened to harvest in future hunting seasons. Geozone K12 is currently allocated to LUD II (Land Use Allocation), emphasizing roadless conditions, with minimum development occurring in the past.

The remaining eight Geozones (C10, C18, C22, C23, C25, K05, S08 and S09) allow subsistence as well as sport harvest, with Geozones C18, C23, and C25 giving priority to subsistence users in the rural communities of Haines, Klukwan, and Hoonah (ADF&G, Alaska Game Regulations, No. 30, Effective July 1, 1989). These eight Geozones are located within the State's Game Management Units 1A, 1B, 1C, 1D, 4 and 5. All of the Game Management Units have experienced timber harvest and Units 1A-1D have had extensive mineral activities since the turn of the century.

The ANILCA Section 813, 1987 report to Congress states (page IV-17) that the mountain goat populations in Game Management Units 1A, 1B, 1C, 1D, 4 and 5 are all moderate to high with a trend of stable to increasing in all. The 1980-1987 annual harvest of mountain goat for Game Management Units 1, 4 and 5 was 121, 54 and 9 respectively, with a total annual harvest of 184 from the Tongass. The 1989-90 harvest for the three areas was 130, 33 and 8 for a total of 148 animals. In the 1989-90 hunting season, fifteen of these animals were taken by non-residents of Alaska. Due to changes in the regulation requiring non-resident hunters to have an Alaskan guide present during goat hunting, hunting is down from previous years.

Biologists with the Alaska Department of Fish and Game believe that the mountain goat population is doing well in spite of a fairly cold 1988-1989 winter (ADF&G, Southeast Alaska Fish and Wildlife News, 1990). Mountain goat population estimates for Southeast Alaska range from 2,000 to 3,000 animals. Given the ten percent harvest allowance of the Alaska Department of Game and Fish (Flynn, 1989), harvest displayed in the Alaska Game Harvest records for the period 1980-89 were at a level that could be maintained into the foreseeable future, without regulating non-rural hunting in order to provide for subsistence-qualified residents. Isolated areas where continued low animal counts have resulted after the harvest year will need to be monitored closely (Lynn Canal

area, GMU 1C) to avoid overharvest of the herds (ADF&G, Southeast Alaska Fish and Wildlife News, 1990).

Abundance of mountain goats and the distribution of the animals across the Forest is best met by Alternative A because of limited development potential in winter habitats which constitute the most limiting factor in mountain goat survival (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-581). Alternative D may cause reductions in habitat capability, but not of significance to effect the population of mountain goats used for subsistence purposes. Alternatives E, B, F, G, and C fall within the range set by Alternatives A and D. For additional discussion of the Alternatives on mountain goat, see the Wildlife section of this Chapter.

Based on data available for analysis, it is unlikely that future development activities would lead to a significant possibility of a significant restriction of subsistence use of mountain goat.

Black Bear. Black bear are very widespread across the Tongass. In terms of subsistence harvest black bear is considered in the Tongass Resource Use Cooperative Survey as "Land Mammals other than Deer." This category accounted for 4 percent of the total subsistence harvest recorded in the 1987 survey (Kruse and Muth, 1989). Moose meat and black bear meat make up the majority of this category with moose comprising most of the harvest. Black bear meat is considered a small portion of the total subsistence harvest for rural Southeast residents.

Records indicate that historical and current distribution of black bear in Southeast Alaska are the same (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-617). Black bear are present throughout the mainland, and on the islands south of Frederick Sound. They are absent in Geozones: C01, C02, C03, C04, C05, C06, C09, C10, C11, C12, C13, C15 and C20; collectively called the ABC Islands or Admiralty, Baranof and Chichagof Islands. Table 3-89 displays the occurrence of black bear in Southeast and areas of the Forest which are given priority for subsistence harvest use.

TABLE 3-89
BLACK BEAR DISTRIBUTION AND HARVEST

GMU[1]	Geozone[2]	TLMP LUD 1-4[3]	Subsistence Priority[4]	Residents of Rural Community[5]	Open to Sport Harvest[6]	Change in Allocation From Revision Alternatives[7] A	B	C	D	E	F	G
4	C07	2	No	-	No	X	N	N	X	X	N	X
1C	C14	1	Yes	1C HA GU KL HN[8]	Yes	N	N	N	N	N	N	N
1D	C16	1	No	-	Yes	N	N	N	N	N	N	N
5	C17	1	No	-	Yes	N	N	N	N	N	N	N
1C	C18	3	Yes	1C HA GU KL HN[8]	Yes	X	N	N	N	N	N	N
1C	C21	3	Yes	1C HA GU KL HN[8]	Yes	X	L	N	X	N	N	N
5	C22	1R	No	-	Yes	X	X	X	L	X	X	X
1C/D	C23	2-4	Y/N	1C HA GU KL HN[8]	Yes	X	X	N	L	X	X	X
5	C24	2-4	No	-	Yes	X	X	N	L	N	N	N
1C	C25	3-4	Yes	1C,HA,GU,KL,HN[8]	Yes	X	X	N	L	X	X	X
1A	K01	2-4	No	-	Yes	X	X	N	N	N	N	N
1A	K02	2	No	-	Yes	X	X	N	L	N	N	N
1A	K04	2-4	No	-	Yes	X	N	N	L	X	N	N
1A/B	K05	3-4	No	-	Yes	X	X	N	N	N	N	N
2	K06	2-4	No	-	Yes	X	X	N	L	X	N	N
2	K07	2-4	No	-	Yes	X	X	N	L	X	N	N
2	K08	3-4	No	-	Yes	X	X	N	L	X	X	X
2	K09	2-4	No	-	Yes	X	X	N	N	N	N	N
2	K10	4	No	-	Yes	X	X	N	N	X	X	X
2	K11	4	No	-	Yes	X	X	N	N	X	X	X
1A	K12	2	No	-	Yes	N	N	N	N	N	N	N
1A	K13	1	No	-	Yes	N	N	N	N	N	N	N
2	K14	1	No	-	Yes	N	N	N	N	N	N	N
2	K15	1	No	-	Yes	N	N	N	N	N	N	N
3	S01	2,4	No	-	Yes	X	X	N	L	X	N	N
3	S02	3-4	No	-	Yes	X	X	N	L	X	X	X
3	S03	3-4	No	-	Yes	X	X	N	L	N	N	N
3	S04	3-4	No	-	Yes	X	X	N	L	N	N	N
3	S05	3-4	No	-	Yes	X	X	N	N	N	N	N
3	S06	3-4	No	-	Yes	X	L	N	L	X	N	N
3	S07	3-4	No	-	Yes	X	X	N	L	N	N	N
1B	S08	1R-4	No	-	Yes	X	X	N	L	N	N	N
1B	S09	2-4	No	-	Yes	X	X	N	L	N	N	N
3	S10	3-4	No	-	Yes	X	X	N	L	N	N	N
3	S11	1	No	-	Yes	N	N	N	N	N	N	N
1B	S12	1	No	-	Yes	N	N	N	N	N	N	N
3	S13	1-4	No	-	Yes	X	X	N	L	X	N	N
3	S14	3	No	-	Yes	X	X	N	L	N	N	N

Source: Alaska Game Regulations, July 1, 1989-June 30, 1990, No. 30
Revision Database, 2/90 Revision DEIS Alternative Maps A-G
[1]Alaska Department of Fish and Game Management Unit (GMU)
[2]Geozone-planning unit established for the Revision DEIS
[3]Tongass Land Management Plan Land Use Designation (LUD) 1-4. 1R identifies portions of the Forest that were released from wilderness designation and never assigned a new LUD value.
[4]Subsistence harvest specified in the Alaska Game Regulations, July 1, 1989
[5]Rural community (residents) specified by Alaska Game Regulations as having priority use of the resources contained within the Game Management Unit
[6]Skins and skulls of harvested animals require sealing by the Alaska Department of Game and Fish in all Game Management Units listed
[7]Change in land allocations from the existing Forest Plan between Alternatives presented in the Revision DEIS. N=No change from current, X=more restrictive than current and L=less restrictive than current
[8]1C=rural residents of Game Management Unit 1C; HA=Haines, GU=Gustavus, KL=Klukwan, and HN=Hoonah

Thirty-eight of the fifty-one Geozones Forest-wide sustain black bear populations. Of the thirty-eight Geozones occupied by black bear, thirty-seven allow both subsistence use as well as sport use of the resources. The remaining Geozone (C07), allowed no harvest during the 1989-1990 season due to the low number of animals and the naturally-occurring limited habitat available on Pleasant Island (ADF&G, Alaska Game Regulations, No. 30, Effective July 1, 1989).

Eight of the thirty-seven Geozones allowing black bear harvest are located within designated wilderness, C14, C16, C17, K13, K14, K15, S11 and S12 (Revision Database, 2/90). No impacts associated with development are expected to occur in any of the alternatives due to the Wilderness designations for these Geozones.

The remaining twenty-nine Geozones C18, C21, C22, C23, C24, C25, K01, K02, K04, K05, K06, K07, K08, K09, K10, K11, K12, S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S13, and S14, allow subsistence and sport harvest. Geozones C18, C21, C23, and C24 give priority use to subsistence users in the rural communities associated with Game Management Unit 1C, and the towns of Haines, Gustavus, Klukwan, and Hoonah. These twenty-nine Geozones are contained within the State's Game Management Units 1, 2, 3, and 5. All of the Game Management Units have experienced timber harvest with Unit 1 having also experienced extensive mineral activities since the turn of the century.

The ANILCA Section 813, 1987 report to Congress states (page IV-19) that black bear populations in Game Management Units 1, 2, 3, and 5 are high. Harvest of this species for Game Management Units 1, 2, 3, and 5 was 222, 158, 137, and 24 animals respectively for a total of 541 animals (USDI, Subsistence Management and Use, 1988). Population appear to be healthy, are generally lightly hunted relative to population numbers, and are thought to be stable to increasing in all Game Management Units (USDI, Subsistence Management and Use, 1988).

Between 1980-1987 black bear harvest across the Tongass has averaged 361 animals per year. This harvest has taken place in GMU's 1A, 1B, 1C, 1D, 2, 3 and 5 at an annual rate of 45, 14, 70, 113, 97, and 22 respectively (USFS, Analysis of the Management Situation, 1/90, Wildlife, pages 3:733-736). Total habitat capability in 1954 was estimated to have been 14,266 animals and in 1989 estimated at 14,261 animals (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-671). Based on the wildlife habitat capability model developed for the Revision DEIS, this is essentially no change between 1954 and 1989. The Tongass' existing roadless areas provide 89 percent of the habitat capability and the roaded areas provide 11 percent. Overall, the roaded portion of the Tongass is estimated to be about 7 percent of the land base (Revision Database, 2/90). Given the ten percent harvest allowance of the Alaska

Department of Game and Fish (Flynn, 1989), harvest displayed in the 1987 Report to Congress as well as from Alaska Game Harvest Records for the period 1988-1989, use was at a level that could be maintained into the foreseeable future without limiting non-rural use of the resource to provide for subsistence use.

Abundance of black bear and the distribution of the animals across the Forest is best met by Alternative A. Alternative D provides the least amount of habitat capable of producing black bear but only in small increments less than Alternative A (Revision DEIS, Wildlife, Habitat Capability, Black bear). Alternatives E, B, G, F, and C respectively fall within the range set by Alternatives A and D.

Based on data available for analysis, future development activities are not likely to have a significant possibility of a significant restriction of subsistence use of black bear.

Brown Bear (Ursus arctos horribilis). Present day distribution of brown bear is similar to historical locations (Analysis of the Management Situation, 2/90, page 3-611). Brown bears are present on the mainland and on the islands north of Frederick Sound; they are occasionally reported on Mitkof and Wrangell Islands, but are not found on any of the other islands. The populations on Mitkof and Wrangell Islands are not considered to be viable. Table 3-90 displays the occurrence of animals and priority areas provided subsistence users according to the 1989-90 Alaska Game Regulations.

TABLE 3-90
BROWN BEAR DISTRIBUTION AND HARVEST

GMU[1]	*Geozone*[2]	*TLMP LUD 1-4*[3]	*Subsistence Priority*[4]	*Residents of Rural Community*[5]	*Open to Sport Harvest*[6]	*Change in Allocation From Revision Alternatives*[7] *A*	*B*	*C*	*D*	*E*	*F*	*G*
4	C01	2-4	Yes	Residents/Kake	Reg	X	X	N	L	X	N	X
4	C02	3-4	Yes[4]	Residents/Kake	Reg	X	X	N	L	X	N	N
4	C03	1	Yes[4]	Residents/Kake	Reg	N	N	N	N	N	N	N
4	C04	3-4	Yes[4]	Residents/Kake	Reg	X	X	N	L	N	N	N
4	C05	3-4	Yes[4]	Residents/Kake	Reg	X	X	N	X	X	N	N
4	C06	2-2	Yes[4]	Residents/Kake	Reg	X	X	N	L	X	X	X
4	C07	2	Yes[4]	Residents/Kake	Reg	X	N	N	X	X	N	X
4	C09	1	Yes[4]	Residents/Kake	Reg	N	N	N	N	N	N	N
4	C10	3-4	Yes[4]	Residents/Kake	Reg	X	X	N	L	N	N	N
4	C11	2	Yes[4]	Residents/Kake	Reg	N	N	N	L	N	N	N
4	C12	1	Yes[4]	Residents/Kake	Reg	N	N	N	N	N	N	N
4	C13	1	Yes[4]	Residents/Kake	Reg	N	N	N	N	N	N	N
1C	C14	1	No		Reg	N	N	N	N	N	N	N
4	C15	1	Yes[4]	Residents/Kake	Reg	N	N	N	N	N	N	N
1D	C16	1	No		Reg	N	N	N	N	N	N	N
5	C17	1	Yes	Yakutat[9]	Yes	N	N	N	N	N	N	N
1C	C18	3	No	-	Reg	X	N	N	N	N	N	N
4	C20	3	Yes[4]	Residents/Kake	Reg	X	L	N	L	X	N	N
1C	C21	3	No	-	Reg	X	L	N	X	N	N	N
5	C22	1R	Yes	Yakutat[9]	Yes	X	X	N	L	X	X	X
1C/D	C23	2-4	N/N	-	Reg	X	X	N	L	X	X	X
5	C24	2-4	Yes	Yakutat[9]	Yes	X	X	N	L	N	N	N
1C	C25	3-4	No	-	Reg	X	X	N	L	X	X	X
1A	K01	2-4	No	-	Reg	X	X	N	N	N	N	N
1A	K13	1	No	-	Reg	N	N	N	N	N	N	N
1B	S08	R-4	No	-	Reg	X	X	N	L	N	N	N
1B	S09	2-4	No	-	Reg	X	X	N	L	N	N	N
1B	S12	1	No	-	Reg	N	N	N	N	N	N	N

Source: Alaska Game Regulations, July 1, 1989-June 30, 1990, No. 30
Revision Database, 2/90 Revision DEIS Alternative Maps A-G
[1]1-Alaska Department of Fish and Game Management Unit (GMU)
[2]2-Geozone-planning unit established for the Revision DEIS
[3]3-Tongass Land Management Plan Land Use Designation (LUD) 1-4. 1R identifies portions of the Forest that were released from wilderness designation and never assigned a new LUD value.
[4]4-Subsistence harvest specified in the Alaska Game Regulations, July 1, 1989
[5]5-Rural community (residents) specified by Alaska Game Regulations as having priority use of the resources contained within the Game Management Unit
[6]6-Registration or permits required for all sport hunting of brown bear in Southeast with the exception of GMU 5 located on the Yakutat Forelands
[7]Change in land allocations from the existing Forest Plan between Alternatives presented in the Revision DEIS. N=No change from current, X=more restrictive than current and L=less restrictive than current
[8]8-Rural residents of Game Management Unit 4, and residents of Kake, Alaska
[9]9-Residents of Yakutat, Alaska

Little is known about the actual subsistence use of brown bear within rural communities. The Tongass Resource Cooperative Survey identified the use of the resource but found that its use was small when compared to use of other resources such as deer and salmon. The percentage this resource adds to the total subsistence harvest in Southeast Alaska is not known, but assumed to be less than one percent of the total subsistence harvest.

Twenty-eight of the fifty-one Geozones Forest-wide sustain brown bear populations. Of the twenty-eight Geozones occupied by brown bear, all are allowed both subsistence use as well as sport use of the resources (ADF&G, Alaska Game Regulations, No. 30, Effective July 1, 1989).

Ten of the twenty-eight Geozones allowing harvest of brown bear are located within designated wilderness, C03, C09, C12, C13, C14, C15, C16, C17, K13, and S12 (Revision Database, 2/90). Due to designated wilderness being constant in each Alternative in these specific Geozones, no impacts associated with new developments are expected to occur. Public scoping during the early stages of the Revision, did not disclose any information that would lead to a finding otherwise.

The remaining eighteen Geozones (C01, C02, C04, C05, C06, C07, C10, C11, C18, C20, C21, C22, C23, C24, C25, K01, S08, and S09) allow subsistence as well as sport harvest. Geozones C01, C02, C04, C05, C06, C07, C10, C11, C20, C22, and C24, give priority to subsistence users in the rural communities associated with Game Management Unit 4, and the towns of Kake and Yakutat. The eighteen Geozones are contained within the State's Game Management Units 1, 4, and 5. All three of the Game Management Units have experienced timber harvest with Unit 1 also having extensive mineral activities since the turn of the century. Game Management Unit 4 contains Admiralty National Monument, location of the Greens Creek Mine. The Greens Creek Mine is the site of an active mineral production facility located on the northern portion of the Island. The remainder of Game Management Unit 4 is located on Chichagof and Baranof Islands where the Alaska Pulp Corporation Long-term Timber Sale has been active since 1954-1956.

The ANILCA Section 813, 1987 report to Congress states (page IV-18) that brown bear populations statewide continue at high levels. While population density data are difficult to obtain with this species and are often educated guesses, populations generally appear healthy and abundant. Only in a few localized situations are there problems with overharvesting. In Game Management Units 1, 4 and 5, populations are predicted to be moderate, high and high respectively. Harvest of this species for Game Management Units 1, 4, and 5 was 21, 96 and 29 animals respectively, totaling 146 animals (USDI, Subsistence Management and Use, 1988). Brown bear harvests appear to be relatively

high. Mortality of bears due to "defense of life or property" situations continues to increase and in some units is ten percent of the total bear kills.

The activity associated with timber harvest from the Alaska Pulp Corporation Long-term Timber Sale and the Native harvest of private lands in Game Management Unit 4, primarily Chichagof and Baranof Islands, has perhaps been the largest change in brown bear habitat and harvest in Southeast Alaska. Road construction since the early 1980's has increased access to much of northeast Chichagof Island. The expanding access is thought to have contributed to increased hunter success and has also resulted in more frequent human/bear encounters ending with bears killed in "defense of life or property." Because bears are attracted to human refuse dumps, several "defense of life or property" killings have been reported in these locations. In response the Alaska Department of Fish and Game adopted new regulations during the winter of 1988-89. The new regulations established a "controlled use area" which included the previous areas under emergency closure and the following regulations (USFS, Alaska Pulp Corporation Long-Term Timber Sale Contract Final Supplement to the Environmental Impact Statements for the 1981-1986 and 1986-1990 Operating Periods, 11/89):

> -*5 AAC 78.400. Controlled Use Areas*. The use of motorized vehicles for hunting is restricted within the Controlled Use Area.
>
> -*5 AAC 78.300(6)*. No hunting activities are allowed within 1/4 mile of refuse dump sites that are permitted by the Alaska Department of Environmental Conservation. This regulation affects the hunting of brown bear within 1/4 mile of refuse sites such as those at the towns of Hoonah and Tenakee Springs, and the Kennel Creek logging camp.
>
> -*5 AAC 78.020 and 5 AAC 78.120. Subsistence and General Hunting Seasons and Bag Limits for Brown and Grizzly Bear*. The fall hunting season was eliminated and the spring season open only from March 1st to May 20th. In addition, the bag limit is restricted to one bear every four regulatory years and the hunter is required to obtain a registration permit from ADF&G.

The purpose of the new regulations was to allow the Game Board a management option over that portion of the brown bear kills attributable to sport harvest. "Defense of life or property" kills and other bear losses are still expected from increased bear/human encounters. The Game Board has indicated that a solution will ultimately be to regulate hunting use along roads, eliminate improper garbage disposal, and reduce "defense of life or property" kills through public education. The restriction of motorized vehicle use will benefit those who hunt from a boat or walk into the hunting area and discourage those hunters who use vehicles to gain easy access. The overall benefits will include a bear population better

able to sustain itself (USFS, Alaska Pulp Corporation Long-Term Timber Sale Contract Final Supplement to the Environmental Impact Statements for the 1981-1986 and 1986-1990 Operating Periods, 11/89).

Modeled changes in habitat capability since 1954 have resulted in little change Forest-wide. The total habitat capability in 1954 was estimated to have been 10,089 animals and in 1989 estimated to be 9,960 animals; a one percent reduction in habitat capability. Ninety-seven percent of the habitat capability came from roadless areas while the remaining three percent came from roaded portions of the Tongass (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-669).

On a more site-specific basis, several roaded portions of seven Geozones, (C02, C04, C06, C09, C10, C15, and C23), had significant capability reductions since 1954 (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-670). This change in capability (not population) takes into account effects of timber removal, location of harvest units and roads to feeding areas, and impacts on denning while it does not take into account the effects of human disturbance and human-caused mortality (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-670). Wildlife Analysis Areas (developed by the Alaska Department of Fish and Game and consist of approximately 4-5 watersheds 'VCUs' each) where these reductions in capability have been modeled are 4222, 4252, 4253, 3523, 3524, 3551, 3525, 3526, 3308, 3627, 3629, 3001, 3002, 3104, 3105, 3314, 3837, 2408, and 2410.

Abundance of brown bear and the distribution of the animals across the Forest is best met by Alternative A. Alternative D and G provide the least amount of habitat capable of producing brown bear but only in small increments less than Alternative A (Revision DEIS, Wildlife, Habitat Capability, Brown Bear). Alternatives E, B, C, and F respectively fall within the range set by Alternatives A and D/G.

Based on data available for analysis, a significant possibility of a significant restriction of subsistence use of brown bear could occur in Geozones C02, C04, C06, C09, C10, C15 and C23 if development activities are proposed in these areas. Due to the lack of information available on subsistence harvest and use of brown bear specifically in rural communities associated with these Geozones, the extent of this restriction is not known.

Waterfowl/Seasbirds. Waterfowl/seabirds constitute less than one percent of the total subsistence harvest in rural Southeast Alaska. They are harvested by a third or less of the households in all communities except Edna Bay. Ducks are the most important type of bird harvested but contribute an average of only four pounds of edible meat per household per years. Households associated with the highest levels of bird harvest are high income, white, and residing in

Petersburg. These findings suggest that birds may be more culturally important to rural Southeast Alaska residents who grew up in areas where waterfowl hunting was a common activity (Kruse and Muth, 1989).

The State gives no subsistence use priority for the harvest of waterfowl and seabirds to rural residents of any community in Southeast Alaska (ADF&G, Alaska Game Regulations, No. 30, Effective July 1, 1989). Subsistence and sport use is allowed in Game Management Units 1-5 (Southeast Alaska), however, due to the apparent abundance of the resource, no restriction on sport use has occurred.

The Revision DEIS has utilized the Vancouver Canada goose as the Management Indicator Species (MIS) characterizing the broadest range of habitat needs for "effects of alternatives" analysis. The Vancover Canada goose is distributed throughout the Alexander Archipelago of Southeast and populations are estimated in the range of 10,000 birds which are basically year-round residents (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-641). The majority of these birds move locally between nesting, brood-rearing, molting and winter concentration areas.

Virtually all species of waterfowl in Alaska are used for subsistence purposes. The largest subsistence harvest of waterfowl and their eggs occurs during May and June, though birds are taken throughout the summer and fall. In some areas, geese are the most prized subsistence resource. Sport and subsistence hunting, are among several factors that have contributed to the decline of four species of geese in Alaska (USDI, Subsistence Management and Use, 3/88).

At least 65 species of seabirds migrate or breed along Alaska's coastline and adjacent marine waterways. Millions of the breeding and non-breeding populations inhabit hundreds of colonies as they pass through the area. The Alaska coastline supports seabirds of greater variety and abundance than any other location of comparable area in North America (USDI, Subsistence Management and Use, 3/88).

Accurate population information is lacking in many areas and trends are difficult to identify. The success of seabird populations seems to be dependent on the proximity of nesting grounds and the location of preferred food sources (USDI, Subsistence Management and Use, 3/88).

Proposed activities presented in the Revision DEIS that have the greatest potential of impact on waterfowl and seabirds are those utilizing upland habitat in relation to streams, lakes and coastal shorelines. All alternatives have the potential of impacting segments of these habitats provided no mitigation of effects of activities is accounted for. The Revision DEIS has developed management area prescriptions that are implemented in each of the proposed alternatives for mitigating

impacts to habitat associated with waterfowl and seabirds. These management area prescriptions (stream and lake protection, water-quality, special areas, wilderness, wild and scenic rivers, etc.) are designed to protect critical habitats of the waterfowl and seabird resources on the Tongass.

The analysis in the wildlife and timber sections of this Chapter show that no alternatives propose timber harvest in wetland habitats. Because there will be no effect on inland wetland habitat, the waterfowl/seabird abundance and distribution is expected to remain unchanged.

Based on data available for analysis, development activities are not likely to have a significant possibility of a significant restriction of subsistence use of the waterfowl and seabird resources.

Furbearers. In Alaska, twenty species of mammals are classified as furbearers by the Board of Game; however, only thirteen of these are normally harvested and enter the fur trade. No harvest information is gathered for the flying squirrel, Alaskan and hoary marmots, least weasel, or raccoon. The sea otter, which is also classified as a furbearer, is protected under the Marine Mammal Protection Act and is not open to general hunting or trapping (USDI, Subsistence Management and Use, 3/88).

Furbearers are presently being trapped throughout the Tongass in Game Management Units 1-5 (Southeast Alaska). The U. S. Forest Service has no information identifying trends of use for the harvesting of furbearers as it relates to subsistence use. The evaluation assumes that most of the trapping is a result of rural residents use of the resource within close proximity to their residences.

The State of Alaska gives no priority use to rural residents of Southeast Alaska (ADF&G, Alaska Trapping Regulations, No. 30, Effective July 1, 1989) for the harvest of furbearers. Rural use as well as non-rural use is allowed in Game Management Units 1-5 (Southeast Alaska), however, due to the apparent abundance of the resource and limited use by non-rural residents, no restriction on non-rural use has occurred.

Marten were selected as a management indicator species (MIS) of potential project effects on furbearer habitat (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-605). Historically, marten have inhabited only the mainland of Southeast Alaska. They have never dispersed naturally from the mainland to the islands. Through cooperative transplant work between the Alaska Department of Fish and Game and the U.S. Forest Service, marten are now present on many of the islands. At the present time marten are found within all Geozones of the Tongass with the exception of C07 and S14. Specific islands which they are not found on include but are not limited to Douglas, Sullivan and Yakutat

Bay Islands (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-605). These islands are not connected to the larger land mass which makes up the remainder of the Geozones.

Timber harvest and road construction have the highest probability to affect marten habitat (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-605). Past timber harvest and road construction activities have reduced marten habitat significantly in the roaded portions of some Geozones from the 1954 estimated capability (Geozones C02, C04, C05, C06, C09, C10, C15, C18, C23, C24, K04, K06, K08, K11, S01, S04, S08, and S10). However, Forest-wide, the reduction is estimated to be less than four percent (USFS, Analysis of the Management Situation, 1/90, Wildlife, page 3-668) due to less than 7 percent of the Forest being in a roaded condition (Revision Database, 2/90).

Wildlife Analysis Areas (developed by the Alaska Department of Fish and Game and consist of approximately 4-5 watersheds each) where these reductions in capability have been modeled are 4222, 4252, 4253, 3523, 3524, 3551, 3525, 3526, 3310, 3311, 3308, 3627, 3629, 3001, 3002, 3104, 3105, 3314, 3837, 2306, 2408, 2410, 4508, 101, 408, 407, 509, 406, 405, 1319, 1422, 1421, 1530, 1527, 1528, 1529, 1420, 1316, 1318, 1332, 1107, 1213, 1212, 1414, 1525, 1526, 5012, 5013, 2007, 1605 and 5134.

Localized (Wildlife Analysis Area) populations of animals can be expected to decline given present harvest regulations primarily as a result of access opportunities into previously unroaded areas and decreases in habitat due to timber harvest. Since limited subsistence harvest data exists, the effect of increased access directly related to subsistence use is unknown.

One mitigation measure to offset increased access would be to implement harvest regulations similar to that employed by the Alaska Department of Fish and Games "Controlled Use Areas" developed for brown bear harvest in Game Management Area 4. The intent of this regulation was to directly limit the use of motorized vehicles in the harvest of the game animals. By doing so, vehicle access was limited thus discouraging much of the inland use of the resource. This regulation would likely enable populations to replenish at a better rate than anticipated if present usage of the resource continues.

Abundance of furbearers and the distribution of the animals across the Forest is best met by Alternative A. Less habitat is lost through timber harvest, fewer roads are constructed for access, and fewer people are associated with woods operations. Alternative D provides the least amount of habitat available, capable of producing marten. Alternatives E, B, F, G, and C, respectively, fall within the range set by Alternatives A and D.

Based on data available for analysis, development activities may lead to a significant possibility of a significant restriction of subsistence use of furbearers (specifically marten) in Geozones C02, C04, C05, C06, C09, C10, C15, C18, C23, C24, K04, K06, K08, K11, S01, S04, S08, and S10. Due to lack of information available on subsistence harvest and use of furbearers (specifically marten), this finding is based on the assumption that most use in these Geozones is by rural residents within close proximity to the resource.

Small Game. Grouse, ptarmigan and hare populations fluctuate considerably throughout the State. Populations are typically small and very localized. Due to recurrent cycles of abundance and scarcity, their populations fluctuate. A complete cycle will last anywhere from eight to twelve years. Coastal populations seem to exhibit less drastic fluctuations than small game populations in the interior. These fluctuations should not be confused with a depletion in the resource (USDI, Subsistence Management and Use, 3/88).

Although the percentage of small game birds in the meat harvest of subsistence users in Alaska is small, studies have shown that a large percentage of families harvest the birds. Hunting pressure, however, has little effect on fluctuations in populations over broad geographical regions of Alaska. Moreover, the management goals of providing the maximum opportunity to participate in small game hunting are currently being met (USDI, Subsistence Management and Use, 3/88).

Small game habitat may be affected by other human activity in the State. Some habitats have been lost or altered by urbanization. Timber harvest activities and fires may enhance habitat for hares and grouse, while reducing it for ptarmigan.

Factors other than human activity which can cause an increase or decrease in small game populations are not well understood, but usually include food supply, weather, predation, disease and chick mortality during cold, wet springs.

No subsistence use priority is given by the State to rural residents of any community in Southeast Alaska (ADF&G, Alaska Game Regulations, No. 30, Effective July 1, 1989) for the harvest of small game. Rural use as well as non-rural use is allowed in Game Management Units 1-5 (Southeast Alaska), however, due to the apparent abundance of the resource, no restriction on sport use has been made.

None of the alternatives proposed in the Revision DEIS are anticipated to present measurable impacts to the small game resources found in Southeast Alaska. Public scoping for the Revision did not bring up an issue of the past or potential habitat reductions impacting the subsistence use of these resources.

Based on data available for analysis, development activities are likely not to have a significant possibility of a significant restriction of subsistence use of the small game resources.

Access

Historical access to subsistence hunting and fishing areas on the Tongass will not be impacted by any of the proposed Revision alternatives. Historical access has been by foot, boat and floatplane and is available in all the alternatives for present and proposed foreseeable future activities. This is a result of none of the alternatives limiting use on public lands for the purposes of subsistence gathering activities (Section 811 (a-b) ANILCA).

Roads constructed on the Tongass primarily for timber harvest activities and to a lesser scale for mineral and recreational activities, have changed the use patterns for subsistence, by providing new access to portions of the Forest not previously utilized. Road construction radiating from established communities allows residents to choose between traditional access means or other means (i.e., vehicles, snow machines, three and four wheelers, etc).

Rural communities which have roads connected to their population base are displayed in Table 3-91. Roaded Geozones are displayed in Tables 3-80 to 3-86. In both tables, access is displayed by (1) road connection to a community, (2) road connection to a community with Alaska Marine Highway services and (3) road available but not having a connection to the community.

TABLE 3-91
AVAILABLE ACCESS TO SOUTHEAST COMMUNITIES

Rural Community	*Small Boat*[1]	*Float Plane*[2]	*Ferry System*[3]	*Road w/ Ferry Access*[4]	*Road w/o Ferry Access*	*Road Sys Avail No Connect*[5]	*Jet Service*[6]
Angoon	X	X	X	-	-	-	-
Cape Pole	X	X	-	-	X	X	-
Coffman Cove	X	X	-	-	X	X	-
Craig	X	X	X-Ho[3]	X	-	X	-
Edna Bay	X	X	-	-	X	X	-
Elfin Cove	X	X	-	-	-	-	-
Gustavus	X	X	-	-	X	-	X
Haines	X	X	X	X	-	-	-
Hollis	X	X	X	X	-	X	-
Hoonah	X	X	X	X	-	X	-
Hydaburg	X	X	X-Ho	X	-	X	-
Hyder	X	X	X	-	-	-	-
Kake	X	X	X	X	-	X	-
Kasaan	X	X	-	-	-	X	-
Klawock	X	X	X-Ho	X	-	X	-
Klukwan	X	X	X-Ha[3]	X	-	-	-
Metlakatla	X	X	X	X	-	-	-
Meyers Chuck	X	X	-	-	-	-	-
N.Whale Pass	X	X	X-Ho	X	-	X	-
Pelican	X	X	X	-	-	X	-
Petersburg	X	X	X	X	-	X	X
Point Baker	X	X	-	-	-	X	-
Port Protection	X	X	-	-	-	X	-
Port Alexander	X	X	-	-	-	-	-
Saxman	X	X	X	X	-	-	X
Sitka	X	X	X	X	-	X	X
Skagway	X	X	X	X	-	-	-
Tenakee Springs	X	X	X	-	-	X	-
Thorne Bay	X	X	X-Ho	X	-	X	-
Wrangell	X	X	X	X	-	X	X
Yakutat	X	X	-	-	X	X	X
TOTAL	31	31	14DIR 6INDIRECT	17	5	19	6

Source: Alaska Marine Highway Schedule-Fall, Winter,Spring 12/1/89-5/15/90
Alaska Airlines Time Tables-Effective December 15, 1989 Tongass Resource Use Cooperative Survey (2/89)
1989-94 Operating Period for the KPC Long-Term Sale Area 1986-90 Operating Period for the APC Long-Term Sale Area

[1]Recreational, commercial fishing or charter boats access from the community to surrounding areas.

[2]Commercial or personal floatplane access from other communities or the community listed.

[3]Direct Access-community with scheduled Alaska Marine Highway stops. Indirect-road system connecting community listed to a community with scheduled stops. X-Ho-road system connected to Hollis, X-Ha-road system connection to Haines.

[4]Road system connected to the Alaska Marine Highway Terminals.

[5]Road system adjacent to the community but having no road connection from the town or village to the road system. Community has access to road system by other means (i.e., boat, floatplane).

[6]Community with scheduled commercial jet services (Alaska Airlines, Delta).

All communities having new road access to previously underutilized subsistence areas have capitalized on the opportunity to expand their range provided by the road systems (Bosworth, 1989; Ellanna and Sherrod, 1987: and Mills and Firman, 1986). As a result of the new road construction, new use patterns are displayed around each of the communities (USFS, Tongass Resource Use Cooperative Survey Draft Maps, 1988). Often, only the corridor of the road is used, however, for analysis purposes, the entire watershed in which the activity has occurred has been identified as important to subsistence purposes (Figure 3-38).

Considering only the access provided by new road construction, some rural communities in Southeast Alaska have stated that they favor the new access for subsistence gathering (USFS, Alaska Pulp Corporation Final Supplement to the EIS for the 1981-86 and 1986-90 Operating Periods, Subsistence Hearings Record and 1989-94 Operating Period for the KPC Long-term Sale Area FEIS, Subsistence Section). Roads provide safe access to wildlife and fish habitat that would not have been possible when inclement weather nullified boat travel, cost of air travel was excessive, or distances to potential sites was too great to make the trip by foot.

Alternative D, provides the most access to new subsistence use areas, while Alternative A provides the least amount in the form of new road construction. Alternatives C, B, G, F, and E range between Alternatives D and A.

Based on data available for analysis, development activities are not likely to lead to a significant possibility of a significant restriction of subsistence access to the resources.

Competition

Competition for subsistence resources is a result of factors such as fish and game regulations, mobility, the natural distribution of game species across the Tongass, decreases in resource populations as a result of habitat reductions, decreases in resource populations as a result of overharvest, and access provided to all rural communities in the form of roads, Alaska Marine Highway System and commercial air carriers. As a result of these factors and the majority of the population (Juneau and Ketchikan residents) residing in non-rural designated communities, competition for the more abundant wildlife and fisheries resources around rural communities results (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June, 1988).

Competition for wildlife and fisheries resources on Chichagof (Geozones C01, C02, C04, and C06) and Prince of Wales Islands (Geozones K06, K07, K08 and K11) has resulted from increased road systems, community access via roads and ferry system routes, and the fact that non-rural residents do not live

in locations where abundant wildlife resources exist. Non-rural residents have sought out the resources provided on these islands for sport use. The largest numbers of hunters on both islands by any one community is attributed directly to the use by Juneau and Ketchikan residents (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June, 1988). These two communities being non-rural, thus not qualifying for subsistence privileges, compete for the resources also sought by rural residents of the other 31 communities in Southeast plus rural residents of logging and mining camps.

Rural residents living in the many communities of Prince of Wales and Chichagof Islands find that they too, have the opportunity to hunt in non-traditional areas that were previously underutilized. Competition between rural communities has resulted from the interconnected road systems of these two Southeast Alaska Islands (USFS, Alaska Pulp Corporation Long-Term Timber Sale Contract, Final Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods, 11/89).

Issues have also been raised about competition for subsistence resources in the community of Yakutat, Alaska. Although no interconnecting road system between communities exists and no ferry connection is available via the Alaska Marine Highway System, competition for the fish and wildlife resources has occurred as a result of an influx of non-resident and non-rural residents. Yakutat supports one of the most abundant upland salmon harvest systems in the Southeast Alaska (Revision DEIS, Chapter 3, Fish). Big game species of brown bear and moose exist on the Yakutat Forelands and are easily accessed (Revision DEIS, Chapter 3, Wildlife). Commercial air service is available to Yakutat from anywhere in the world, and commercial air service out of Yakutat to the Forelands provides access to the resource populations found there. As a result of this easy access and abundant resources in both fish and wildlife species, competition is an existing factor in the management of fish and game.

Competition for the subsistence resources is also a result of abundance. In areas of the Tongass where over harvest of the resource, reduction of habitat or natural reduction in the populations as a result of weather occurrences, demand for the fish and wildlife resources has been shown to move from historical harvest areas to new areas. An example of this move has been shown on Kuiu and Mitkof Islands, which at one time supported large deer populations that have been reduced by predation and overwinter kills (USFS, Analysis of the Management Situation, 1/90, Wildlife). Residents of communities such as Port Alexander, Kake, Petersburg, Wrangell, Point Baker, Cape Pole and others have shown historical use of both Kuiu and Mitkof Islands (USFS, Tongass Resource Use Cooperative Survey, Areas ever Hunted 'Deer', Draft Maps, 1988). Due to decreases in populations of deer on both these islands, harvest use areas have moved to new areas where the resources presently exist. Increased pressure and competition for the resources has occurred as a result of this

move on Admiralty (C15), Baranof (C09, C11, and C13) and Chichagof (C04 and C06) Islands (USFS, Tongass Resource Use Cooperative Survey, Draft Maps, 1988).

Assumptions made for analyzing the differences between alternatives due to competition for subsistence resources include:

1. New road construction adjacent to communities with ferry access will result in increased competition from outside communities.

2. New road construction adjacent to existing road systems where interties between communities exists, will result in increased competition from surrounding communities associated with the inter-connected roads.

3. Habitat reductions for subsistence resources has the potential of producing fewer animals. If regulations allow use to remain constant then increased competition will result from the same number of users seeking fewer huntable resources.

4. The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Given the above assumptions, Alternative A would provide the least amount of competition for subsistence resources from non-rural residents. Alternative D would provide the most competition as a result of increased road construction, decreases in habitat, decreases in harvestable populations and increases in non-rural residences. Alternatives E, F, G, B and C respectively fall within the range set by Alternatives A and D.

At some point in time, the Alaska Boards of Game and Fish may have to use their authority to further regulate non-rural harvest of game and fish populations due to the competition for resources in Geozones C01, C02, C04, C06, K06, K07, and K11. They may also have to prioritize the harvest of game and fish resources among the rural communities whose residents are harvesting resources outside their typical home-range areas. This in essence would place non-rural use of the resources back to pre-roaded use allotments. This type of action, as prescribed by ANILCA Section 804, may be necessary to ensure the availability of adequate abundance of resources needed by rural communities using the Tongass National Forest in the future.

Based on data available for analysis, development activities could lead to a significant possibility of a significant restriction of subsistence use. This potential restriction is a result of competitive use of the resources by non-rural as well as rural residents outside their home ranges in Geozones C01, C02, C04, C06, C09, C10, C11, C13, C15, K06, K07, K08, and K11.

Table 3-92 displays whether or not a potential restriction on subsistence is likely as a result of anticipated development activities for Alternatives displayed in the Revision DEIS.

TABLE 3-92
SIGNIFICANT POSSIBILITY OF A SIGNIFICANT RESTRICTION OF SUBSISTENCE USE OF WILDLIFE RESOURCES[1]

Alternatives	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Abundance/ Distribution	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Access	No	No	No	No	No	No	No
Competition	Yes	Yes	Yes	Yes	Yes	Yes	Yes

1-"No" Indicates an insignificant possibility of a substantial effect. "Yes" indicates a significant possibility of a substantial effect.

Table 3-93, Affected Areas, Resources and Rural Communities summarizes where the finding of a significant possibility of a significant restriction of subsistence use has the potential to occur. Rural community abbreviations are:

Code/Community	*Code/Community*
AN = Angoon	KL = Klukwan
CP = Cape Pole	ME = Metlakatla
CC = Coffman Cove	MC = Meyers Chuck
CR = Craig	WP = North Whale Pass
EB = Edna Bay	PE = Pelican
EC = Elfin Cove	PG = Petersburg
GU = Gustavus	PB = Point Baker
HA = Haines	PP = Port Protection
HO = Hollis	PA = Port Alexander
HN = Hoonah	SX = Saxman
HB = Hydaburg	SI = Sitka
HY = Hyder	SK = Skagway
KK = Kake	TS = Tenakee Springs
KA = Kasaan	TB = Thorne Bay
KC = Klawock	WR = Wrangell
	YA = Yakutat

Thirty-one communities are designated rural in Southeast Alaska. The two communities classified as non-rural are Juneau and Ketchikan.

TABLE 3-93
AFFECTED AREAS, RESOURCES AND RURAL COMMUNITIES

Geozone	*Deer*	*Brown Bear*	*Resource/Action Affected* *Furbearer*	*Competi- tion*	*Communities*[1]
C01	X	-	X	-	EC,GU,HN,PE,PP,SI,WR
CO2	X	X	X	X	AN,EC,GU,HA,HN,PG,PE,PE,SI,SK,TS,WR
CO3	X	-	-	-	EC,HN,PE,SI
C04	X	X	X	X	AN,HA,HN,PE,SI,SK,TS,WR
C05	-	-	X		AN,PE,PE,PP,SI,TS,WR
C06	X	X	X	X	GU,HA,HN,PE,TS,WR
C07	X	-	-	-	GU,HA,HN,PE,TS,WR
C09	X	X	X	X	AN,KK,KL,MC,PA,PE,PE,PP,SI,TS,WR,
C10	X	X	X	X	AN,PA,PE,PE,PP,SI,TS,WR
C11	-	-	-	X	EB,KK,PA,PG,PE,PP,SI,TS,WR
C12	X	-	-	-	HN,PE,PE,SI,WR
C13	X	-	-	X	EB,KK,PA,PG,PP,SI,TS,WR
C15	X	X	X	X	AN,HA,HN,KK,KL,PA,PG,PE,PP,SI,SK,TS,WR
C18	-	-	X	-	HN,SK,TS,WR
C20	X	-	-	-	AN,HA,HN,PG,SK,TS,WR
C23	X	X	X	-	HA,KL,PE,PP,SI,WR
C24	-	-	X	-	YA
C25	X	-	-	-	PE,WR
K04	-	-	X	-	HB,HY,KA,ME,SA,TB,WR
K06	-	-	X	X	CC,CR,EB,HB,HO,HY,KK,KA,KL,MC,ME,WP
	-	-	-	-	PA,PG,PE,PP,SA,TB,WR
K07	-	-	-	X	HB,HY,KA,MC,ME,PP,SA,WR
K08	-	-	X	X	CR,EB,HB,HO,HY,KC,KA,MC,ME,WP,PE,PP,SA
	-	-	-	-	TB,WR
K11	-	-	X	X	CC,CP,CR,EB,HO,KC,MC,ME,WP,PA,PG,PE,PP
	-	-	-	-	SA,TB,WR
K15	X	-	-	-	CP,EB,HB,PG,PE,WR
S01	-	-	X	-	CP,KK,PA,PG,PE,PP,SI,WR
S04	-	-	X	-	PE,PP,WR
S08	X	-	-	-	PE,PP,WR
S10	-	-	X	-	CR,KK,PA,PG,PE,PP,WR

[1]Appendix 'N', Rural Communities Use by Geozone

Fisheries. Salmon, other finfish (i.e., halibut, cod, rockfish, etc.), and invertebrates (i.e., clams, crab, abalone, etc.) are an important and widely used subsistence resource. All rural communities in Southeast Alaska (Figure 3-37, Rural Communities Resource Uses) use each of these resources for subsistence. About 61 percent of the per capita subsistence harvest is attributed to the fisheries resources (Kruse and Muth, 1989).

Subsistence use of the fisheries resources in the State of Alaska has been recognized by the State Legislature with specific regulations for to subsistence use and activities being developed (ADF&G, Subsistence and Personal Use Finfish Fishing Regulations Westward, Central and Southeast Alaska, 1989). The rural communities of Southeast Alaska designated specifically for priority uses of the fisheries resources are: Klukwan, Haines, Hoonah, Angoon, Sitka, Kake, Saxman, Kasaan, Klawock, Craig and Hydaburg. The remaining 20 rural recognized communities of Southeast are not specifically identified in the regulations (ADF&G, Subsistence and Personal Use Finfish Fishing Regulations Westward, Central and Southeast Alaska, 1989).

Salmon. Harvest of salmon species constitutes 21 percent of the total harvest of subsistence resources (USFS, Tongass Use Cooperative Survey, 1988). Species harvested by the largest percentage of households in Southeast Alaska were kings (42 percent) and cohos (38 percent) (USFS, Tongass Resource Use Cooperative Survey, 1988). The estimated 508,000 pounds of king salmon harvested in 1987 accounted for 42 percent of the total salmon subsistence harvest.

The Fish Section in this Chapter describes the effects of other resources on salmon capability and harvest projections. In this Section, Dolly Varden char, coho and pink salmon are used as Management Indicator Species (MIS) to describe the effects of development on the overall fish production from the Forest.

Chapter 3, Fish Section, displays estimates of capability changes for Dolly Varden char. That section indicates that Forest-wide Dolly Varden capability is at 99.2 percent of the 1954 value. The greatest magnitude of change has occurred on the Ketchikan Area, followed by the Stikine Area, and the Chatham Area. These relationships appear to be related to the extensive timber harvest on Prince of Wales Island between 1954-1988, and the vast unharvested acreages of forested lands on the Chatham Area.

Chapter 3, Fish Section, also displays estimates of capability changes for Coho salmon. This section shows that coho capability is currently estimated at 100.1 percent of the 1954's capability. Without the construction of fish ladders to access additional stream habitat, the current capability would be 99.3 percent of the 1954 capability. The largest decrease in habitat capability, without enhancement, has been 1.4 percent on the Ketchikan Area. The largest percentage of coho fish passage enhancement has also occurred on the Ketchikan Area (.9 percent) followed by the Stikine (.7 percent) and Chatham Areas (.2 percent) (USFS, Analysis of the Management Situation, 1/90, Fish, page 3-118).

Figure 3-34, Fish Habitat Capability Estimates of Natural Habitat Capability and Figure 3-35, Smolt Habitat Capability Estimates (USFS, Analysis of the Management Situation, 1/90, Fish pages 3-100 and 3-104), show an increase in capability of approximately three percent between 1954 and 1988. The increase ranges from one percent on the Chatham Area (known to be an underestimate due to modeling considerations) to six percent on the Stikine Area. Since no negative impacts to pink salmon habitat capability are predicted, only increased access to stream habitat due to construction of fishways is shown.

Capability estimates for salmon habitat across the Forest show insignificant changes or slight increases since 1954 (period when intensive timber development began as a result of the long-term timber sale contracts). In all alternatives habitat capability is maintained either in non-development management areas or in development management areas specifically related to timber and minerals production. Maintenance of the habitat is achieved by the maintenance of aquatic habitats along streamside zones where the production of anadromous and resident fish are present. On a localized watershed, reduction in capability can be expected to be greater than shown on a Forest-wide basis; however, since only a small portion of the Forest (7 percent) has been roaded (Revision Database 2/90), only a small effect on fish habitat capability has occurred when averaged across the entire Forest.

Habitat availability does not appear to be the limiting factor affecting subsistence harvest of the salmon resources. Corresponding to the reductions in habitat capability have been tremendous increases in numbers of fish harvested, by commercial, sport and subsistence users (USFS, Analysis of the Management Situation, 1/90, Fish). The subsistence portion of the harvest accounts for a small portion of the total harvest. If subsistence is being impacted by not having enough of the resource to harvest, then allocation changes are necessary to meet the current and projected demand for subsistence users. The Fish and Game Boards for the State of Alaska have the authority to recommend these changes; the Alaska Department of Fish and Game is responsible for ensuring their enforcement.

Abundance of salmon and the distribution of their populations across the Forest is best met by Alternative A; Alternative D has the potential of impacting the greatest amount of salmon habitat even though the amount is projected to be insignificant Forest-wide. Alternatives E, B, F, G, and C respectively fall within the range set by Alternatives A and D.

Based on data available for analysis, no significant restriction of subsistence use of salmon resources from development activities is anticipated. Conclusions of this section are that ample habitat for salmon production is available on the Tongass. Ample salmon resources presently exist for subsistence use. The

allocation of salmon for subsistence use is the factor leading to any shortages or restrictions of the resource if such a shortage is identified.

Other Finfish. This segment of the subsistence resource use accounts for nearly 24 percent of the total subsistence harvest (Kruse and Muth, 1989). Halibut is the most commonly harvested finfish other than salmon with 48 percent of all rural households catching one or more halibut in 1987 (Kruse and Muth, 1989). As with invertebrates, other finfish are perhaps most impacted by development activities associated with coastal locations, regulations allocating them to commercial and sport users, and increases in harvest due to changes in technology. The following section, *Invertebrates*, discusses potential effects of coastal locations by alternatives and associated impacts on subsistence.

Invertebrates. This segment of the subsistence resource use accounts for nearly 16 percent of the total subsistence harvest (Kruse and Muth, 1989). The species harvested by the largest percentage of residents are clams and cockles and dungeness crab. When considered from the perspective of mean edible pounds harvested, dungeness crab is the most important invertebrate species. Another notable invertebrate resource is shrimp which is harvested by at least a third of all households in Edna Bay, North Whale Pass, Yakutat, Hollis, Meyers Chuck, Elfin Cove, and Hyder. Also important on a regional basis are abalone, gumboot, herring eggs, king crab, tanner crab and octopus. On the average, long-term Native households harvest more invertebrates than other households (Kruse and Muth, 1989).

The greatest impact to invertebrates occurring from development activities would result in coastal development or storage of material in saltwater bays. Of primary concern is the location of log transfer facilities, raft storage grounds, land access sites, and storage of materials toxic to fish resources in close proximity to saltwater access.

The potential impacts at log transfer sites relate primarily to the deposition of bark. Laboratory tests have shown that bark deposits may be a source of toxic organic leachates that may be deleterious to salmon fry and crab larvae. The accumulated bark may also smother benthic organisms. Due to tidal currents, type and age of material taken across the facility and methods of placing material in the water, the rate of bark accumulation varies with conditions at each facility. The design of the facility determines the rate at which the log bundles enter the water. Increased speed of entry is directly related to the amount of bark dislodged from the logs. Log raft areas accumulate bark at a much slower rate than the immediate area of the log transfer facility. Little quantified information is available that documents decomposition, flushing, recovery times, recolonization rates, or other information about the longevity of bark and its effects on the marine benthic habitat.

Toxic substances, occurring as leachates from bark, precipitate in saltwater; therefore, leachates do not appear to be a major problem in open water or where good circulation exists (Sedell and Duval 1985). Recently, dissolved substances, such as hydrogen sulfide and ammonia, have been shown to occur in interstitial water of bark deposits when bark accumulates on the bottom (Freese and O'Clair, 1985). These substances remain within the bark and do not go into solution. However, if Dungeness crabs burrow into the bark deposit, a decrease in reproductive capability, egg maturation, eating habits, and overall survival can be demonstrated (Freese and O'Clair, 1984). Studies have demonstrated that waste wood leachates are toxic in concentrated forms to fish and shellfish such as shrimp and salmon. However, due to adequate flushing and circulation in the natural environment, toxic concentrations have not been shown to be a measurable impact.

Other effects associated with existing log transfer facilities relate to oil, grease and petroleum products pollution. The source of these contaminants may be the operation and maintenance of equipment used in log handling and transfer operations. Persistent loss of small volumes of petroleum products is a concern, as water soluble compounds have been shown to be toxic to marine larvae and eggs at concentrations of 0.1 mb/l USFS, Alaska Pulp Corporation Long-Term Timber Sale Contract, Final Supplement to the Environmental Impact Statement for the 1981-1986 and 1986-1990 Operating Periods, 11/89, Chapter 3, Marine Environment).

Log transfer facility guidelines have changed during implementation of the Forest Plan. This has been a result of new guidelines developed from monitoring of existing facilities and review by an interagency task force. The Alaska Timber Task Force created a Log Transfer Committee which further chartered a Log Transfer Facility Guidelines Technical Subcommittee. The final "Log Transfer Facility Siting, Construction, Operation and Monitoring/Reporting Guidelines" which resulted from this effort was released in October 1985 (USFS, Analysis of the Management Situation, 1/90, Transportation, page 3-495).

Forest-wide, 172 potential new log transfer facility construction sites have been located. Thirty-four sites are existing and functional with an additional 44 sites existing and in need of reconstruction. Thirty-eight sites have been abandoned after use and are not expected to be put back in operation for future use (USFS, Analysis of the Management Situation, 1/90, Transportation, page 3-496). If all sites were in operation, less than 1 percent of the total estuarine area with depths less than 60 feet would be affected.

Abundance of other finfish and invertebrates and the distribution of their populations across the Forest is best met by Alternative A; Alternative D has the potential of effecting the greatest amount of other finfish and invertebrates habitat even though the amount is projected to be insignificant forest-wide.

Alternatives E, B, F, G, and C respectively fall within the range set by Alternatives A and D.

Based on data available for analysis, no significant restriction of subsistence use of the other finfish and invertebrate resources is anticipated from development activities.

Access

Historical access to subsistence hunting and fishing areas on the Tongass will not be effected by any of the proposed Revision alternatives. Historical access has been by foot, boat and floatplane and is available in all the alternatives for present and foreseeable future activities (See discussion under 'WILDLIFE/ ACCESS' in the previous section for more detailed display of access concerns in Southeast Alaska). None of the alternatives limit use on public lands for the purposes of subsistence gathering activities (Section 811 (a-b) ANILCA).

Based on data available for analysis, no significant restriction of subsistence access to the fisheries resources is anticipated from development activities.

Competition

The issue of competition for subsistence fisheries resources has been raised related to the regulation of harvest by commercial and sport users of the resources. Native leaders raised this concern during the 1989 Southeast Summit Conference for Subsistence; it has also been raised by the general public. The most recent issue of competition for the fisheries resources has been raised by a group representing subsistence fishermen and the Tlingit-Haida Central Council. Their claim is that the State of Alaska has poorly managed the harvest of sea cucumbers by commercial interests and the stock is now in jeopardy. The suit against the State asks for a court injunction to immediately halt commercial harvest of the resource in all of Southeast Alaska so that the sea cucumber will not be overfished similar to stocks of rockfish, abalone and king crab. (Juneau Empire, April 5, 1990).

The availability of the fisheries resources and habitat is abundant for subsistence use purposes. Due to the varying interests by each group, allocations between commercial, sport and subsistence uses is open to debate. Competition between rural and non-rural use of specific locations on the Tongass due to decreases in the availability of fish and invertebrates or overharvest of the resources has been expressed on a number of occasions as being important issues to be addressed (USFS, Alaska Pulp Corporation Long-term Timber Sale Supplement to the EIS for the 1981-86 and 1986-90 Operating Periods).

As discussed in the Wildlife/Competition section, due to the interconnection of roads and some non-rural and non-residents residing in logging camps near rural communities, there may be some increased competition for fisheries resources between rural communities. However, due to the number of people involved, competition for the resources has not been conveyed as a problem

through public scoping for the Revision DEIS and is not expected to be a problem in the foreseeable future.

Based on data available for analysis, no significant restriction from competitive uses of the resources by rural and non-rural residents is anticipated from development activities.

Table 3-94 displays whether or not a potential restriction on subsistence could occur from development activities that are likely to result from each of the Revision alternatives.

TABLE 3-94
SIGNIFICANT POSSIBILITY OF A SIGNIFICANT RESTRICTION OF SUBSISTENCE USE OF FISHERIES RESOURCES[1]

Alternative	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Abundance/ Distribution	No	No	No	No	No	No	No
Access	No	No	No	No	No	No	No
Competition	No	No	No	No	No	No	No

1-"No" Indicates an insignificant possibility of a substantial effect. "No" indicates a significant possibility of a substantial effect.

Marine Mammals. With the exception of Alaska Natives, harvest of marine mammals is prohibited by Federal Law. Subsistence use of marine mammals is not common in all of the rural communities of Southeast (Figure 3-37, Rural Communities Resource Use), and comprises approximately 3 percent of the total per capita subsistence harvest (Kruse and Muth, 1989).

Harbor Seal. The harbor seal is the only marine mammal harvested by rural Southeast Alaska residents for its meat. Harbor seal accounts for about 3 percent of the total subsistence harvest. The main communities involved in harbor seal harvest are: Angoon, Hoonah, Kake, and Yakutat. Upland development of forest resources has no documented relationship to the abundance and distribution of this resource. For analysis purposes, little impact to harbor seal populations is assumed with the Alternatives presented.

Based on data available for analysis, no significant restriction of subsistence use of the marine mammal resources abundance and distribution is anticipated when development activities are proposed.

Access

Historical access to subsistence hunting and fishing areas on the Tongass will not be affected by any of the proposed alternatives of the Revision. Historical access has been by foot, boat and floatplane and is available in all the alternatives for present and foreseeable future activities proposed. See discussion under "Wildlife/Access" in the previous section for more detailed display of access concerns in Southeast Alaska. None of the alternatives limit use on public lands for the purposes of subsistence gathering activities (Section 811 (a-b) ANILCA).

Based on data available for analysis, no significant restriction of subsistence access to the marine mammal resources is anticipated when development activities are proposed.

Competition

Competition for subsistence marine mammals resources has not been expressed as a concern in public scoping for the Revision. The availability of the resources at this time is considered adequate in areas of use (USDI, Subsistence Management and Use, 3/88). Use of the resources is primarily by Native individuals within close geographic proximity to the resource.

As indicated in the discussion under the Wildlife/Competition section, there may be some increased competition for subsistence marine mammal resources between rural communities due to the interconnection of roads. The number of people involved is small; competition for the resources has not been conveyed as a problem through public scoping for the Revision DEIS and is not expected to be a problem in the foreseeable future.

Based on data available for analysis, no significant restriction from competitive uses of the resources by rural and non-rural residents is anticipated when development activities are proposed.

Table 3-95 displays whether or not a potential restriction on subsistence will result from the Alternatives displayed in the Revision DEIS.

TABLE 3-95
SIGNIFICANT POSSIBILITY OF A SIGNIFICANT RESTRICTION OF SUBSISTENCE USE OF MARINE MAMMALS RESOURCES[1]

Alternatives	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Abundance/ Distribution	No	No	No	No	No	No	No
Access	No	No	No	No	No	No	No
Competition	No	No	No	No	No	No	No

[1] "No" indicates an insignificant possibility of a substantial effect. "YES" indicates a significant possibility of a substantial effect.

Plants. Most Southeast Alaska rural communities use plants for a portion of their subsistence harvest (Figure 3-37, Rural Communities Resource Use). Edible plants (i.e., kelp, goose-tongue, berries, etc.) account for about 3 percent of the total per capita subsistence harvest (Kruse and Muth, 1989). Non-edible plants (i.e., firewood, timbers, houselogs, etc.) account for approximately 7 percent of the total per capita subsistence harvest in Southeast by rural communities (Kruse and Muth, 1989).

Edible Plants. Most traditional gathering of plant type products occurs near beach and estuarine areas. In all alternatives, the only activities that may pose any impact on the abundance and distribution of plant products is that of log transfer facilities which are not identified on a site-specific basis in this document.

Log transfer facilities (LTF's) will impact the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: (1) structural embankment (placing rock in the water) and (2) bark deposition (bark that accumulates underwater). All LTF types occupy approximately the same amount of bottom area. Ramp designs extend out into the water but are narrow in comparison to the bulkhead designs. Bulkheads do not extend as far into the water, but are wider than ramps. Thus, each are estimated to cover the same amount of bottom area (approximately 1/4 acre per site) (USFS, Analysis of the Management Situation, 1/90, Transportation, page 3-493).

The extent of change to the marine and benthic habitat was studied in 1985 (Faris and Vaughan, 1985). Their results indicated that from the 90 sites permitted at the time, a total of 176 acres would be impacted (using 1.96 acre of bark and structural composition as an average per site). This is 0.02 percent of the total estuarine area that is less than 60 feet deep. Moreover, when they examined all of the potential area of bark and debris accumulation from all permitted and proposed sites in Southeast Alaska, they found that a total of 317 acres would

be impacted. This accounted for 0.09 percent of the total estuarine area less than 60 feet deep in all of Southeast Alaska. This result corresponds with the conclusion of Sedell and Duval (1985) that the evidence of damage on important marine populations was inconclusive because the area impacted by log transfer facilities was so small. This evidence resulted in development of the current siting guidelines, which ensure that LTF's impacts will be minimized.

The proposed timber harvest activity would improve the short-term availability of berries. Based on this increase of berries and the locations of the potential activities, immediate and foreseeable effects of the proposed alternatives are not expected on their abundance and distribution.

Based on data available for analysis, no significant restriction of subsistence use of the edible plant resources abundance and distribution is anticipated when development activities are proposed.

Non-edible plants. No change in the U.S. Forest Service personal free use policies in Alaska for Alaskan residents for firewood, timber and other products is proposed in the Revision. No effect on the availability of firewood, personal use timber and other products (e.g., spruce roots, hemlock bark, etc.) is anticipated in any alternatives.

Based on data available for analysis, no significant restriction of subsistence use of the non-edible plant resources abundance and distribution is anticipated when development activities are proposed.

Access

Historical access to subsistence hunting and fishing areas on the Tongass will not be affected by any of the proposed Revision alternatives. Historical access has been by foot, boat and floatplane and is available in all the alternatives for present and foreseeable future activities proposed. See discussion under "Wildlife/Access" in the previous section for more detailed display of access concerns in Southeast Alaska. None of the Alternatives limit use of public lands for subsistence gathering activities (Section 811 (a-b) ANILCA).

Based on data available for analysis, no significant restriction on access to subsistence resources is anticipated.

Competition

Competition for subsistence plant resources was not expressed as a concern during the Revision's public scoping process. Concern has been raised however about regulating commercial interest's harvests should some of the plant resources become commercial products. This concern was raised by Native leaders during the 1989 Southeast Summit Conference for Subsistence. At this time, resources are abundant in their areas of use. Resources are used primarily by individuals within close proximity to the resources sought out. Competition,

rural versus non-rural or subsistence versus commercial, does not appear to be an issue.

As indicated in the discussion under the Wildlife/Competition section, there may be increased competition for subsistence plant resources by various rural communities due to road interconnection as well as from some non-rural and non-resident individuals residing in camps near rural communities. However, due to the number of people presently involved, competition for the resources has not been conveyed as a problem and is not expected to be a problem in the foreseeable future.

Based on data available for analysis, no significant restriction from competitive uses of the resources by rural and non-rural residents is anticipated when development activities are proposed.

Table 3-96 displays whether or not a potential restriction on subsistence use of the plant resources will result from the alternatives displayed in the Revision DEIS.

TABLE 3-96
SIGNIFICANT POSSIBILITY OF A SIGNIFICANT RESTRICTION OF SUBSISTENCE USE OF PLANTS RESOURCES[1]

Alternative	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Abundance/ Distribution	No	No	No	No	No	No	No
Access	No	No	No	No	No	No	No
Competition	No	No	No	No	No	No	No

[1]"No" Indicates an insignificant possibility of a substantial effect. "YES" indicates a significant possibility of a substantial effect.

Effects of Forest Management on Private Property

Tracts of private land owned by Native Corporations adjacent to the Tongass National Forest support extensive timber harvest operations. Due to the large size of clearcutting operations and rate of timber harvest on these lands over the last ten years (Geozones C02, C04, C15, C21, C24, C25, K03, K06, K07, K08, K09, and S03), wildlife populations on the private land, especially deer, are expected to substantially decline over the next two decades. Native-owned tracts of land are located in Alaska Department of Fish and Game Management Units 1A, 1C, 2,3,4 and 5. Consequently, lower deer density as well as density of other game species on private lands may increase demand for sport and subsistence hunting opportunities on adjacent National Forest lands.

Assuming that most remaining private timber will be removed within the next 10-12 years (USFS, Analysis of the Management Situation, 1/90, ANSCA-Native Timber, 3-347, January, 1990), there will be a reduction in the amount of high volume old-growth habitats on these lands. Harvesting has occurred on lands around Kake, Hoonah, Cube Cove, Hobart Bay, Craig, Hollis, Klawock, Hydaburg, Metlakatla, and Yakutat. In the future, as second-growth stands mature, there will be a reduction in understory biomass (Alaback, 1984). The combination of the following factors; (a) reduction of forage; (b) loss of high volume winter habitat; and (c) poor juxtaposition of habitats will cause habitat capability to decline in the long term. Within 25 years, the mean winter capability is predicted to decline by about 50 percent on private lands (USFS, Ketchikan Pulp Company 1989-94 Operating Period FEIS, Section 4, page 218). As the clearcuts age and become less suitable for deer and other game species, hunters will move onto the National Forest, thereby increasing hunting pressure on the National Forest. This may lead to reduced hunter success and may lead to more restrictive bag limits or elimination of sport hunting to insure the Section 804 of ANILCA priority for subsistence users.

Availability Other Lands

The Revision process is considering all federal lands contained within the Tongass National Forest. The availability of other lands which would be adequately suitable and available for the purpose sought to be achieved by this Environmental Impact Statement do not exist. Therefore there are no other lands available for consideration.

Alternative Actions

The Revision DEIS considers seven alternative actions for management of the Tongass National Forest. The alternatives presented are a depiction of a range of management considerations emphasizing some resources over others. The alternatives discussed constitute the "other alternatives" which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

Mitigation

The Revision considers mitigative measures (measures that will minimize impacts by limiting the degree or magnitude of an action and its implementation) for effects of proposed actions in all alternatives. The degree of mitigation varies in the amount of lands available for consideration of development activities by alternative. Each alternative is mitigated similarly by allowed activities directed by the Forest-wide Standards and Guidelines (Appendix G) and Best Management Practices (BMP's). These guides meet the requirements for management of the National Forest System lands (36 CFR 219.27).

Variations in the amount of mitigation applied in each alternative, are caused by the allocation of specific Management Area prescriptions (Appendix F): less development occurs in Alternative A, which emphasizes wilderness management, and more development occurs in Alternative D, which emphasizes timber harvest and development activities. Because subsistence use primarily involves the

harvesting of fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities.

Where the Timber Production, Visual-Timber, Roaded Natural, Scenic Viewshed and Minerals management area prescriptions would normally be applied, fish habitat is protected in each alternative through the application of riparian management prescriptions to all perennial streams and riparian areas. In management areas, such as the Primitive Recreation where management is normally less potentially impacting than could occur in a riparian management area, a riparian management prescription would not apply.

Water quality in Class III streams would be provided with variable treatment. Some Class III streams would have narrow,"no harvest" buffers, although most would be available for the consideration of clearcut harvest to the streambank. Best Management Practices (BMP's) for streamside harvest would apply.

Mitigation to maintain and enhance deer habitat may be accomplished by several means. Examples are: (a) following timber harvest, thinning to wider spacing is provided to allow greater forage production later in the age of the stand and (b) allocating numerous important locations across the Forest to old-growth prescriptions as well as prescriptions not allowing development (i.e., primitive recreation, beach fringe, research natural areas, semi-primitive recreation, etc.). Lands where the above prescriptions are applied have been removed from the timber harvest land base and provide the continuation of habitat into the next as well as future planning periods.

The U.S. Forest Service may control access on Forest Service constructed roads. Roads may be closed at the end of or during sale activities to limit vehicle access into hunting and fishing areas. Traffic control by road closure is effective if it is done quickly and in consultation with affected public. Once use of previously unroaded areas becomes commonplace, road closures may be a potential source of significant impacts on subsistence gathering activities by limiting access.

A final mitigative measure over which the U.S. Forest Service has minimal control are game harvest regulations. Regardless of the availability of habitat to support harvestable fish and wildlife populations, if overharvest occurs on a continuing basis, populations of these resources may be depleted. Implementation of regulations is under the control of the State of Alaska. The State has reduced harvest by regulation modifications for non-rural residents in portions of Southeast Alaska where overharvest of specific resources has occurred.

CUMULATIVE EFFECTS

The Revision DEIS displays the past, present and reasonably foreseeable effects on subsistence from development activities. The timber and minerals sections of Chapter 3 display in detail the effects of cumulative impacts on all the resources. A summary of these sections discussion is presented here.

Past Activities

Timber harvest has been perhaps more influential in changing the landscape than any other use of the resources. With timber harvest comes roading, log transfer facility development, crew camps ranging from a few years in duration to establishment of new towns, rock pits, and reductions in old-growth associated habitat. Between the turn of the twentieth century and the early 1950's, timber harvest averaged about 35 million board feet annually (or approximately 1000 acres per year). Although relatively small amounts of timber were harvested during this period of time, most of this material came from high volume stands located along the coast (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-340). Stands such as those harvested prior to 1950 along the coastal fringes of Southeast are today considered important wildlife habitat for overwintering herds of deer and for bald eagle nesting sites. Clearcut harvest of the better stands along the coast was at times accomplished by A-Frame and tractor type logging systems. For the most part however, single tree selection of the coastal fringe was the primary harvest system. Material harvested was used for mining, fish trap construction, and met part of the demand for airplane construction material during the war years. Between 1,000-1,300 acres of forested lands were converted to second-growth stands on an annual basis (USFS, Analysis of the Management Situation, 1/90, Timber, 3-346).

After the early 1950's, the long-term timber sale contracts emerged. Timber harvest since the mid-1950's has averaged approximately 352 million board feet per year (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-342). Old-growth forested lands were converted to second-growth stands at a rate of approximately 9,000 acres per year. At present, approximately 7 percent of the productive stands (volume greater than 8 thousand board feet per acre) and about 7 percent of the Forest has been roaded (USFS, Analysis of the Management Situation, 1/90, Roadless Area, pages 3-419 and 3-328).

In contrast to timber harvest, mining played an extensive agent of change in the early part of this century. Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau (USFS, Analysis of the Management Situation, 1/90, Minerals and Geology, page 3-174). This discovery sparked keen interest and by the turn of the century dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained quite active until World War II. From the close of World War II to the mid-1970's exploration and mineral production in Southeast compared to the activity documented at the beginning of the century remained

low. Prospecting and exploration generally increased during the mid-1970's, in part due to the Quartz Hill and Greens Creek discoveries, improved metal prices, and deregulation of gold. Metal prices have continued to improve since the mid-1970's, resulting in increased exploration and renewed interest in precious metals, mainly gold.

Timber harvest associated with the mining activity is not, for the most part, visible today. Reductions in habitat capability as a result of mining are insignificant due to the small amount of acreage involved for waste and tailings disposal. Most ground disturbed by these activities has regenerated and grown stands of trees that are now 70-80 years old. Large tracts of land were harvested for the purposes of mine timbers and construction materials needed for the towns and tramways associated with the mines. Today, evidence of the activity is visible but limited due to the age of the second-growth timber stands that have engulfed the old workings. Of concern in many of the old sites are the tailings deposits which may continue to leach out heavy metals into surrounding streams and lakes.

Present Activities

Present activities are displayed in terms of implementation of the current Tongass Land Management Plan. The period of time covered during this phase is from 1979 to present.

Timber harvest since implementation of the current Forest Plan including both the long and short-term timber sales harvest of net sawlog volume has averaged approximately 295 million board feet per year (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-445). About 8,200 acres of old-growth productive forested lands have been converted to second growth each year (Revision DEIS, Timber Section, Tongass National Forest Timber Harvest History). Timber harvest of old-growth stands during Tongass Land Management Plan implementation has accounted for approximately two percent of the productive forest land base.

Approximately 100 miles of road has been constructed annually to access the timber harvested during this time period (USFS, Analysis of the Management Situation, 1/90, Transportation, page 3-517). Presently about thirty-four existing and functional log transfer sites are in use on the Forest; 44 additional log transfer sites are existing but in need of reconstruction if they are to be used again in the future.

Major mineral projects that have become established on the Tongass during implementation of the existing Forest Plan include the Greens Creek Mine on Admiralty National Monument; Quartz Hill inside the boundaries of Misty Fiord National Monument; Kensington, located on the eastern shore of Lynn Canal; Jualin, located on the north shore of Berners Bay; and the Alaska/Juneau (AJ) located on City, State and Bureau of Land Management lands in downtown

Juneau. The Greens Creek Mine is the first of these projects to come on line and begin full-scale production. The Kensington, Jualin and Alaska-Juneau are all in the exploratory phases of mineral development. Should these projects begin development, as is the case with the Greens Creek venture, some impacts to the resources of the Tongass can be expected. Roads will be built to access mine facilities and water ports. Tailings as well as waste rock, can be expected to be deposited on the landscape. Water usage, sediment transfer, and an influx of personnel will be expected from each of the operations with potential for increases in competition. Localized effects on other resources can be expected in Wildlife Analysis Units 2202, 2408, 2410, 2514, 2515, 2517, 3837, and 822.

Results of the Greens Creek Mine have affected the surrounding resources to some degree. Due to some of the mitigation efforts which both the mineral development companies and the U.S. Forest Service sought to achieve, the public scoping process for the Revision did not indicate that subsistence use of these areas had been impacted. Examples of the types of mitigation that have aided in limiting impacts are: minimal camp and personnel on the site year-round, no hunting of wildlife species by company personnel on the site during work or off hours, monitoring of the amount of sediment and heavy metals in adjacent water systems, limiting vehicle use of roads to the mine from Hawk Inlet and from Hawk Inlet to Young Bay, and awareness of environmental concerns for the area to mitigate any unforeseen problems as they arise.

Similar mitigation and development of the other mine prospects in Southeast Alaska may aid in limiting the environmental pressures on the resources as well as use of the resources for subsistence purposes. Public awareness of the impacts associated with mining activities can aid in the safe development of future mineral prospects.

Because reporting acres of timber harvested on private land is not required, the exact acreage harvested by Native Corporations is not known. Due to the extensive harvesting of old-growth forests on these lands, in order to maintain well-distributed harvestable populations of game, surrounding forests on adjacent ownerships must be accounted for. Most Native inholdings are surrounded by National Forest System lands. These lands, if not previously harvested, must be taken into account for maintenance of viable populations on well-distributed basis (See Chapter 3, Wildlife). Native harvest has occurred in Geozones C02, C04, C15, C21, C24, C25, K03, K06, K07, K08, K09 and S03. The estimated acres of old-growth forests harvested on Native lands accounts for approximately 78,000 acres (USFS, Analysis of the Management Situation, 1/90, Timber, 3-461). Forest-wide this accounts for an estimated 1.3 percent of the old-growth productive land base. Viability of wildlife populations may pose a problem in the Geozones listed if the cumulative impacts of private land harvest are not taken into account when harvest on adjacent public lands is considered.

Another significant occurrence since Tongass Land Management Plan implementation has been State land selections for the purpose of community development. Thorne Bay is an example. Established as a logging camp for timber harvest on the Ketchikan Pulp Company Long-Term Timber Sale Contract, Thorne Bay has become a recognized Southeast Alaska rural community surrounded by National Forest Lands. Historical use of the area indicates that this area had been used by other rural communities for subsistence gathering purposes (USFS, Tongass Resource Use Cooperative Survey, Draft Maps, 1988). Establishment of this permanent settlement has resulted in increased competition for the resources. The exact effect of this on subsistence resources is not clear. Although the present influx of people is relatively small, populations are expected to increase over time and create more competition for the resources adjacent to these communities.

Reasonably Foreseeable Future Activities

The two long-term as well as the short-term timber sale contracts will have a decadal ceiling on the timber supply established by the selected alternative in the Record of Decision for the Tongass Land Management Plan Revision. The range at which timber harvest may occur is discussed in Chapter 3 under the Timber Section. The conversion of old-growth timber stands to second-growth stands affects the habitat capability for wildlife species such as deer, marten, brown bear and some species of birds (ptarmigan). If harvest continues on all sales at the rate it has occurred since implementation of the current Forest Plan, over the next ten years, 82,000 acres can be expected to be converted to second-growth (an additional 1.4 percent of the productive forest land base) and approximately 1,100 miles of additional road constructed (less than one percent of the Forest).

With timber harvest activities will come new access, camps, and utilization of the resources by other rural and non-rural residents. With this Revision and future revisions of the Forest Plan, habitat to meet viable populations of all game species on a well-distributed basis must be maintained. How the allocation of fish and game will be distributed between subsistence, sport, and commercial interests will be the responsibility of the Alaska Board of Game and Fish. This type of action, as prescribed by ANILCA Section 804, may be necessary to ensure the availability of adequate subsistence resources needed by the rural communities using the Tongass.

Native harvest of private lands is anticipated to decline to approximately 125 million board feet per year and be sustainable for the next 10-12 years (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-437). This harvest will come primarily from Sealaska lands that have not been harvested to the same degree as other Native lands. Approximately 42,000 acres of productive old-growth forest lands (.7 percent of the productive forest lands Revision Database, 2/90) will be converted to second-growth stands. If land selections are initiated to acquire new lands previously unharvested, then additional acres

can be expected to be converted and additional reductions in fish and wildlife habitat capability will likely result.

Mineral prices are highly variable in todays' market. If maintained or increased, then one or more of the mineral prospects currently being explored can be expected to be developed. These include, but are not limited to, the Kensington, Jualin, Greek Boy, AJ, and Herbert. Presently no decision has been made to develop these prospects to their fullest potential. Further exploration and cost analysis is necessary prior to a decision to fully develop.

Summary of Findings

The alternatives considered in the Tongass Land Management Plan Revision DEIS although not required to be, were evaluated consistent with Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) on potential effects on subsistence uses and needs. The resulting information, evaluation, and finding are found in Chapter 3 and Appendix N. The analysis includes information on the rural communities, the resources, and the effects of anticipated actions of the alternatives considered in detail, the effects of the proposed actions on subsistence uses and needs, the availability of other lands for the purpose of management of the Tongass, and consideration of other alternatives which would reduce or eliminate development activities from land needed for subsistence.

In conducting the evaluation, it is determined that, in combination with other past, present and reasonably foreseeable future actions, the proposed actions of Alternatives A-G, if implemented may significantly restrict subsistence uses of deer, brown bear, and furbearers (specifically marten) due to potential effects on abundance/distribution, and competition.

Public notice and hearings consistent with Section 810 (a) (1-2) of ANILCA, will be implemented in the rural communities of Angoon, Cape Pole, Coffman Cove, Craig, Edna Bay, Elfin Cove, Gustavus, Haines, Hollis, Hoonah, Hydaburg, Hyder, Kake, Kasaan, Klawock, Klukwan, Metlakatla, Meyers Chuck, North Whale Pass, Pelican, Point Baker, Petersburg, Port Protection, Port Alexander, Saxman, Sitka, Skagway, Tenakee Springs, Thorne Bay, Wrangell, and Yakutat.

This evaluation also indicated that current as well as projected populations of deer, brown bear, and marten are insufficient to meet the modeled demand under mean habitat capability conditions in Geozones C03, C11, C13, C15, C20, C23 and K15. These Geozones are currently undeveloped, wilderness or roadless areas of the Tongass. This is not a result of habitat capability depletions based on modeled outputs, but a result of overharvest of the resources.

Notice and Hearings

Section 810 (a) (1-2) of ANILCA requires the notification of appropriate State agencies, local communities, and regional councils and hearings in the vicinity of affected communities. As a result of the findings of the Revision in

regards to the possibility of significant restrictions on subsistence uses and needs, the U.S. Forest Service will notify appropriate parties and hold hearings in the affected communities. Notification and hearings will be held either in coordination with or separate from the community meetings seeking public comment on the Draft Revision. Scheduling of these meetings will be made after the DEIS is released for public review.

DEIS Preliminary Determination

Section 810 (a)(3) of ANILCA requires that when a significant restriction would possibly result, determinations must be made in regard to:

- such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the National Forest lands;

- the proposed activity shall involve the minimum amount of National Forest Lands necessary to accomplish the purposes of such use and occupancy, or other disposition;

- reasonable steps shall be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Necessity and Consistency with Sound Management of Public Lands. The actions proposed in the Tongass Land Management Plan Revision Draft Environmental Impact Statement have been examined to determine whether they are necessary and consistent with sound management of public lands. Standards used for the review include but are not limited to (1) the National Forest Management Act of 1976, (2) the Alaska National Interest Lands Conservation Act, (3) the Alaska Regional Guide, (4) the Tongass Land Management Plan, (5) the Tongass Land Management Plan 1985-86 Amendment, (6) the Alaska State Forest Practices Act, and (7) the Alaska Coastal Management Program.

Based on the analysis of the information presented in this document on the proposed alternatives, these actions are necessary and consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Proposed Action. The amount of land necessary to undertake the proposed actions is, considering sound multiple-use management of public lands, the minimum necessary. Decreases in the amount of land necessary could result from harvest of higher volume stands on fewer acres of the Forest and concentration of log transfer facilities areas by establishment of more extensive road systems. However, a disproportionate amount of the best habitat would be lost and increased access could result in greater competition for game species; no area of the Tongass could receive concentrated harvest operations without impacting one or more rural communities' important subsistence use area (Map SA-1, Important

Subsistence Use Areas of the Tongass and Appendix 'N', Important Subsistence Watersheds for Rural Communities); and harvestable populations of game species could not be maintained in a natural distribution across the Forest.

Minimizing Adverse Impacts Upon Subsistence Uses and Resources. The Forest-wide Standards and Guidelines as well as specific Management Area Prescriptions found in Appendix 'G' and 'F' respectively and mitigation measures of the proposed Alternative will be implemented as part of the action. Subsistence is addressed specifically in the Forest-wide Standards and Guidelines. The Management Area Prescriptions have no specific prescription for subsistence; however, the Management Area Prescriptions are designed to maintain fish and wildlife habitat productivity at the highest level possible, consistent with meeting commitments of the other resource use and disposition.

FEIS Final Determination

A final determination will be made in the Record of Decision for the Final Environmental Impact Statement for the Revision. The final determination will revisit the above criteria and make final determinations on each of the categories considering further information obtained from hearings, public comments on the Revision DEIS, and other sources incorporated in preparation of the FEIS. The summary of the evaluation, findings and determinations will be contained in the Record of Decision.

THREATENED, ENDANGERED, CANDIDATE, AND SENSITIVE SPECIES

AFFECTED ENVIRONMENT

Threatened and Endangered Species

Federally listed Threatened and Endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, under authority of the Endangered Species Act of 1973, as amended. An **endangered species** is defined as one which is in danger of extinction throughout all or a significant portion of its range. A **threatened species** is defined as one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Candidate Species

Candidate species are those being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Candidate species fall into three categories: *Category 1* is comprised of species about which the agencies currently have substantial information to support the biological appropriateness of proposing to list them as endangered or threatened. Development and publication of proposed rules on these species are anticipated. *Category 2* comprises species, which information, now in possession of the agencies, indicates that proposing to list as endangered or threatened is possibly appropriate, but on which conclusive biological vulnerability and threat to species data are not currently available to support proposed rules. *Category 3* comprises species that were once considered for listing as endangered or threatened, but are not currently receiving such consideration; these species are either now extinct, no longer taxonomically recognized as a species or subspecies, or are more widespread and abundant than previously thought. Species listed as threatened or endangered are provided statutory protection under the Endangered Species Act of 1973, as amended; candidate species are not provided statutory protection.

State Endangered Species

The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the Alaska Department of Fish and Game to list Alaska endangered species.

Sensitive Species

Sensitive species are those plant and animal species identified by the Regional Forester whose population viability is a concern on National Forests within the Region. Sensitive species may also be those species whose current populations and/or habitats are reduced or restricted, their habitats and/or populations are considered vulnerable to various management activities, and special management emphasis is needed to prevent the species from becoming threatened or endangered. Identification of sensitive species and emphasis on the management of sensitive species habitat are USDA Forest Service policy and not directly

related to Federally designated threatened and endangered species which are protected under the Endangered Species Act. The USDA Forest Service goal for sensitive species management is to ensure that species numbers and population distribution are adequate so that no Federal listing will be required and no Forest extirpation will occur.

Table 3-97 summarizes threatened, endangered, candidate and sensitive species which occur on or adjacent to the Tongass National Forest.

TABLE 3-97
THREATENED, ENDANGERED, CANDIDATE AND SENSITIVE SPECIES OCCURRING ON OR ADJACENT TO THE TONGASS

	Federally Listed		*State Listed*	*Regional*
	T/E	*Candidate*	*Endangered*	*Sensitive*
Humpback Whale	E	-	E	-
Gray Whale	E	-		-
Sei Whale	E	-		-
Sperm Whale	E	-	-	-
Bowhead Whale	E	-	-	-
Fin Whale	E	-	-	-
Blue Whale	E	-	E	-
Black Right Whale	E	-	E	-
American Peregrine Falcon	E	-	E	-
Arctic Peregrine Falcon	T	-	E	-
Steller (Northern) Sea Lion	T	-	-	-
Plants				
Thlaspi arcticum	-	2	-	-
Calamagrostis crassiglumis	-	2	-	-
Carex lenticularis var. dolia	-	2	-	-
Montia bostockii	-	2	-	-
Poa merrilliana	-	2	-	-
Poa norbergii	-	2	-	-
Cypripedium montanum	-	3c[1]	-	-
Draba ventosa var. ruaxes	-	3c[1]	-	-
Gentianella propinqua ssp. aleutica	-	3c[1]	-	-
Poa laxiflora	-	3c	-	-
Rhinanthus arcticus	-	3b[1]	-	-
Animals				
Glacier Bay Water Shrew	-	2	-	-
North American Lynx	-	2	-	-
Marbled Murrelet	-	2	-	-
Prince of Wales Flying Squirrel	-	3c[1]	-	-
Sumez Island Ermine	-	3c[1]	-	-
Glacier Bear (color phase of black bear)	-	3c[1]	-	-
Osprey	-	-	-	S
Peale's Peregrine Falcon	-	-	-	S
Trumpeter Swan	-	-	-	S
Northern Pike	-	-	-	S
Large Chum Salmon	-	-	-	S
Island Run King Salmon	-	-	-	S

Source: Official correspondence with the U. S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game, Federal Register of 27 September 1985, Federal Register of 6 January 1989. Federal Register of 5 April 1990.
[1]Category 3c includes species that are now considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, than previously thought. Category 3b includes taxa considered taxonomically invalid.

Information for each of the endangered, threatened, category 2, and regional sensitive species is presented in the following paragraphs. Since category 3b and 3c species are either taxonomically invalid or less subject to identifiable threats than previously thought, additional discussion is not presented here.

Endangered Species

The following summary of the whales was provided by the National Marine Fisheries Service (letter September 11, 1987) and Alaska Department of Fish and Game (letter February 6, 1987).

Humpback whales (*Megaptera novaeangliae*) are the most abundant endangered whales that occur in Southeast Alaskan waters. Their populations in the North Pacific are about 1,200, which is about 8 percent of pre-whaling numbers. During the summer feeding season, these whales range widely from the subarctic boundary (about 40 degrees North Latitude) north into the Chukchi Sea. The greatest population densities are reached in certain inshore waters, where the animals appear to be largely resident during the summer and autumn. Baker et al. (1985) estimate that 300-350 humpback whales inhabit Southeast Alaska during the summer and fall. The main foods of humpback whales in Southeastern Alaska are euphausiaceans (*Euphausia pacifica*), herring (*Clupea harengus*), and capelin (*Mallotus villosus*). Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Humpbacks summering in Southeast Alaska have been linked to each of the three wintering areas in Mexico, Hawaii, and Asia.

Gray whales (*Eschrichtius robustus*) are endemic to the north Pacific. The eastern Pacific population now numbers about 16,000 animals, about the same as existed prior to commercial whaling; whereas the western Pacific population is apparently on the verge of extinction. The eastern population spends the summer in the northern Bering and Chukchi Seas, and migrates along the coast to winter grounds on the west coast of Baja California, where the calves are born. Twice each year virtually the entire eastern Pacific population of gray whales passes along the outer coast, mostly within 5 kilometers of the beach. The northward migration of animals, by Southeast Alaska, without calves, takes place from March to early May, with a peak in early April. Cows with calves migrate later. The southward migration takes place during November and December. Gray whales do not feed while migrating along the California coast, but possible surface-feeding behavior has been reported during spring migration at Cape St. Elias. On the summer grounds gray whales feed primarily on benthic gammaridean amphipods.

The **sei** (*Balaenoptera borealis*) and **sperm whales** (*Physeter macrocephalus*) generally move in and out of the offshore areas seasonally. The population of the sperm whale is still considered to be at harvestable levels by the International

Whaling Commission with a world population exceeding 980,000 and an eastern North Pacific population of 274,000, 80 percent of pre-exploitation levels. Estimates of the North Pacific population of the sei whale range from 22,000 to 37,000 animals, 65 percent of pre-exploitation levels. Whaling of this stock ceased after 1975 when sei whales were protected.

Bowhead whale. At about 25 percent of its pre-exploitation levels, the bowhead whale (*Baleana mysticetus*) population is in excess of 4,000 animals and is increasing. There is a low and closely regulated harvest of bowheads. The bowhead whale has not been reported in the Gulf of Alaska.

Fin whale. The North Pacific fin whale (*Balaenoptera physalus*) population is between 15,000 and 19,000 animals, about 40 percent of historic levels. Fin whales will generally move in and out of the offshore areas seasonally and are infrequently taken by Alaska Natives.

Blue whale. The North Pacific population of blue whales (*Balaenoptera musculus*) is 1,600, less than one-third of historic levels. Although only occasionally found in coastal waters, blue whales are observed in the Aleutian Islands and enter the Chukchi Sea through passes in the Aleutian Chain. Survey information is limited, but there is no evidence that North Pacific stocks are recovering despite their complete protection for twenty years.

Right Whale. Known to occur in the Gulf of Alaska, eastern Aleutian Islands, and southcentral Bering Sea, the North Pacific population of the right whale (*Balaena glacialis*) may be as low as 100 animals. They were formerly found near Kodiak Island and off the Alaska panhandle. Because of their low numbers, their use of coastal waters, and apparent low reproductive rate, right whales may be the most vulnerable of all whales to habitat incursion and deterioration.

American Peregrine Falcon (Falco peregrinus anatum). The American peregrine falcon is primarily associated with interior Alaska for breeding, nesting and rearing of young; it occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987).

Threatened Species

Arctic peregrine falcon (Falco peregrinus tundrius). The Arctic peregrine falcon is primarily associated with area north of the Brooks Range and Seward Peninsula; it occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987).

Steller (Northern) sea lion (Eumetopias jubata). On April 5, 1990, the northern sea lion was given an emergency listing as a federally threatened species. At this time, the National Marine Fisheries Service has not identified critical habitat but plans to do so as part of permanent rule making (45 CFR 613, Fed. Reg. Vol. 55, No. 66, April 5, 1990). Proposed projects that may affect sea lion habitat will undergo consultation with National Marine Fisheries Service prior to any decision to implement.

Candidate Species

Glacier Bay water shrew (Sorex alaskanus). The Glacier Bay water shrew has only been documented to exist in one locality: Point Gustavus, Alaska. To our knowledge, there are only two sources of literature documenting its existence: 1) Proceeding of the Washington Academy of Science (2):18, March 14, 1900; 2) Journal of Mammalogy (7):58, February 15, 1926. These two sources are cited in The Mammals of North America by Hall and Kelson, 1959. Hall and Kelson suggest that it may be a sub-species of Sorex palustris.

Other than the documentation that the species exists at Point Gustavus, no other information is available; nothing is known about its distribution, population status, or habitat requirements.

North American lynx (Felix lynx canadensis). The North American Lynx is found in very low numbers only on the mainland in Southeast Alaska. It is legally harvested during the trapping seasons. The snowshoe hare (Lepus americanus), its principal prey species, is restricted to the mainland and is found primarily on the glacial flats and river valleys. Hare populations never reach the high densities attained at cyclic peaks in the interior (Meehan 1974), and this may be a principal factor for the very low numbers of lynx. There is current debate over whether the species should continue to be trapped.

Marbled murrelet (Brachyramphus marmoratum). The marbled murrelet is a robin-sized seabird that belongs to the family Alcidae. The following information on the marbled murrelet is taken from Marshall (1988): It is found throughout the North Pacific, with two subspecies being recognized. The Asiatic subspecies ranges from Kamchatka south to Japan; the North American subspecies ranges from the Aleutian Islands, Kodiak Island and Kenai Peninsula of Alaska south to central California, with individuals wintering as far south as southern California.

The species feeds below the water's surface on small fish and invertebrates. Inland saltwaters, and occasionally inland freshwater lakes, are also used.

Unlike most other species in the family Alcidae, it does not nest in colonies, although at some sites it may nest in small aggregations. In parts of Alaska where well-developed, coniferous forests are absent, ground nests have been found on steep slopes in tundra or alpine habitat. One nest on the Alaskan

tundra was found in a rocky cavity. From Southeast Alaska south, the species has been found nesting only in large conifers. Only four definite tree nests have been found; two in Siberia, and two in North America. These nests consisted of depressions in moss or lichens on the branches of old-growth conifers.

Over 100,000 of the species occur in Alaska, and many thousands range off British Columbia coasts and inland waterways. Summer population estimates for the lower Pacific states are 1,900-3,500 breeding pairs in Washington, less than 2,400 breeding pairs in Oregon, and less than 1,000 breeding pairs in California. Marbled murrelets have a low reproductive rate, with only one egg laid per clutch.

On June 12, 1989, Peter Paton of the Pacific Southwest Forest and Range Experiment Station, provided a workshop at the Juneau Ranger District to provide an update on current knowledge and research for the marbled murrelet. The following is information he provided at the workshop (ref. June 12, 1989 meeting notes):

> Two sub-species of the marbled murrelet exist: a Siberian sub-species and a North American sub-species. They feed on fish and krill in the ocean, are usually found within a couple miles of the shore, rarely found more than 4 miles from shore.
>
> They nest on land and lay only one egg. Seven ground nests have been found for the Siberian sub-species, one nest in a rocky crevice. Up until 1974, no nests had been found for the North American sub-species. On August 7, 1974, the first nest was found in a California State Park. Located right above a campsite in a campground, this nest was 10 miles inland from the Pacific Ocean, 140 feet high in an old-growth Douglas-fir tree on a 45 cm wide limb. In 1984 during a marbled murrelet research project conducted by the Alaska Department of Fish and Game, a tree nest was found on Baranof Island. This nest was on a large horizontal limb, 25 meters up in a mountain hemlock tree. Tree nests have been documented in the Soviet Union; one of the nests was in the top of a broken snag. In 1989, two more tree nests were found in California. Both nests were in large Douglas-fir trees, on large horizontal limbs. Both nests were watched 24 hours a day. A newly hatched bird at one of these nests was carried off by a raven.
>
> It is reported that Bob Armstrong found a marbled murrelet egg along the Treadwell Trail on Douglas Island during July 1989. Arlene Doyle found a bird sitting on the ground 5 miles inland in a stand of trees at Yakutat. In both cases, no nests were found.

Both males and females incubate marbled murrelet eggs. One bird stays at the nest for 24 hours, while the other is feeding on the ocean. After hatching their young, the adults only stay at the nest with the young bird for about 4 days. After that, the young bird is left alone in the nest, except when the adults return to the nest to feed.

Except for the fall period when they are molting, flightless, and stay on the ocean, birds have been known to fly to tree stands during every month of the year. In California, birds have been found 25 miles inland.

Current marbled murrelet research efforts are aimed at developing techniques for detecting birds as they fly into stands, locating nests, and identifying tree and stand habitat requirements. Evidence to date suggests that birds are using old-growth and not young second-growth stands. Due to the scarcity of older second-growth stands anywhere in their range, information on their use of older second growth is lacking.

Marbled murrelets may be a species which shows a habitat/use relationship with the size of its preferred habitats. Some preliminary data from current research efforts show the highest number of bird detections are in old-growth patches over 500 acres in size, fewer detections are in old-growth patches 100-500 acres in size; no detections have been recorded in old-growth patches less than 100 acres in size. However, it is emphasized that this is only preliminary data analysis. Some of the larger patches of old growth are nearer the ocean, and this could be a factor influencing the number of bird detections rather than the result of old-growth patch size. Marbled murrelets are also social in nature, so larger blocks would naturally be expected to have more birds, and therefore, a higher detection rate, than smaller patches with fewer birds.

There are some indications that uneven-aged timber management may help maintain some degree of habitat and use.

Current populations for the marbled murrelets are estimated at: California - 2,000; Oregon - 2500; Washington - 10,000; Alaska - 250,000 up to millions; British Columbia - unknown.

There are many unknowns pertaining to the habitat needs of this species. Some of them are: We do not know if the birds use the same tree and limb year after year. There is no data on how many birds or pairs will nest in an area. There is no data on use of older second-growth stands. With one egg per pair, there is need to understand population dynamics for the species. Here in Alaska where there is still a large amount of old growth, the species is not evenly distributed in relation to the old growth - so we need to understand

all of the factors influencing its distribution. Old growth is not the only factor which may be influencing populations; other known factors include oil spills, predation, and commercial fishing (murrelets are caught in fishing nets).

Plants

Knowledge of plant species' distribution and abundance in Southeast Alaska is increasing. Since the publishing of plant species in the 27 September 1985 Federal Register, a cooperatively funded review of plant species was conducted for the State of Alaska (Murray and Lipkin, 1987). Agencies cooperating in the review included the U. S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U. S. Forest Service, University of Alaska Museum - Fairbanks). This review made the following recommendations for the Category 2 plant species which have distributions encompassing the Tongass National Forest:

Calamagrostis crassiglumis - change from Category 2 to 3c.
Carex lenticularis var. dolia - change from Category 2 to 3c.
Montia bostockii - change from Category 2 to 3c.
Poa merrilliana - change from Category 2 to 3b.
Poa norbergii - change from Category 2 to 3b.
Thlaspi arcticum - remain as Category 2.

Since *Thlaspi arcticum* is the only plant species currently recommended to remain as a Category 2 species, the following additional information is presented.

Thlaspi arcticum. This plant is a white to lavender flowered mustard in the family, Cruciferae. This plant grows on well-drained sites on alpine slopes, dry ridges, and especially in the sands and gravels of low river terraces and on active floodplains. Although this species is now known from a number of widely spaced locations in Alaska and the Yukon, most of the reports are of one or a very few individuals. The only large populations known are on the Arctic Slope in areas currently being considered for oil exploration and development (Murray and Lipkin 1987). In Southeast Alaska, the only known location is in the Lynn Canal Area.

In the fall of 1989, Region 10 of the Forest Service implemented a sensitive plant species challenge cost-share agreement with the Alaska Natural Heritage Program/The Nature Conservancy. Under this partnership agreement, the Alaska natural Heritage Program will conduct an exhaustive inventory to identify plant species for consideration for sensitive species designation by the Regional Forester. Additional information on plant species can be found in the Analysis of the Management Situation (1/90).

Sensitive Species

Three birds and three fish on the Tongass National Forest have been designated as sensitive species by the Regional Forester: osprey (*Pandion haliaetus*), Peale's

peregrine falcon (*Falco peregrinus pealei*), trumpeter swan (*Cygnus buccinator*), northern pike (*Esox lucius*), Fish Creek chum salmon (*Oncorhynchus keta*), King Salmon River and Wheeler Creek populations of king salmon (*Oncorhynchus tshawytscha*).

Osprey. Four nesting pairs of osprey and eight nest sites have been documented in Southeast Alaska, all located in the Stikine Area (Hughes undated). Nest locations include Thomas Bay, Wrangell Narrows near Finger Point, and near the mouth of McCormick Creek on Wrangell Island. Ospreys have been observed at Towers Arm, Irish Lakes, and Kah Sheets on Kupreanof Island. Nest trees include broken-top spruce (live or dead) and western hemlock snags. All nest trees were located in the hemlock/spruce forest type and near streams or coastal beaches. Ospreys nest from late April through August and probably overwinter in Mexico and Central America. Historically, there is no evidence that there were more osprey in Southeast Alaska. The population numbers have remained stable but low. Limiting factors are unknown, but available nest sites and foraging areas do not appear to be limiting. The interagency task group did not recommend an intensive program for increasing the osprey population because we do not understand the reasons why they have never been more abundant in Southeast Alaska.

Peale's Peregrine Falcon. Thirty-six nests of Peale's peregrine falcon have been located in Southeast Alaska; 32 of which are on the Tongass National Forest. Nest surveys are very difficult to conduct, and biologists believe many more nests may be present. Peregrine nest distribution is closely associated with large sea bird colonies located on the outer coasts or nearby islands. The nest sites are on cliffs from 20 to 275 meters in height and all but one face the open ocean. Seabirds are thought to be major prey of the falcon. Information on falcon breeding biology or reproductive success is limited, but based on U.S. Fish and Wildlife Service surveys, populations do appear to be stable.

Trumpeter Swans. Nineteen pairs of trumpeter swans occur on the Forest at Yakutat; an additional 13 nesting pairs are in the Chilkat Valley on non-National Forest lands. Surveys by the U.S. Fish and Wildlife Service indicate the Yakutat population has been stable, while the population in the Chilkat Valley has increased from 1 pair in 1975 to the current 13 pairs. Trumpeter swans winter in ice-free areas throughout Southeast Alaska; information on wintering habitats and populations is very limited. Numerous swans from other parts of Alaska migrate through Southeast Alaska, and many may be wintering in suitable habitats in Southeast.

Northern Pike. Northern pike are found in five lakes, referred to as Pike Lakes, about 23 miles east of Yakutat (Browning 1986). These lakes are shallow, with high concentrations of humic acid and peat-filled margins. The northern pike in Pike Lakes are the only natural-occurring pike in Southeast Alaska and are

probably remnant populations that survived only because the most recent glacial advance missed the Pike Lakes area. Relatively little information is available on the life history and population dynamics for these pike populations.

Large Chum Salmon. Near Hyder on the Portland Canal, Fish Creek produces very large chum salmon, probably the largest chum salmon in North America. Several fish over 38 pounds have been weighed by biologists. Fish weighing 25 pounds are common. The average size is close to 20 pounds compared to 10 pounds for the average chum stock. A high percentage of the returning fish have spent 4 and 5 years in the ocean, accounting for large average size (S. Zemke, personal communication, U.S. Forest Service). Fish Creek is a low gradient stream, dominated by high quality spawning gravels and extensive areas of groundwater upwelling. The predominant upwelling and high quality spawning gravels appear to be the reasons for the remarkable production levels. The population appears to be stable.

The U.S. Forest Service, in cooperation with the Alaska Department of Fish and Game, have undertaken a program of chum habitat enhancement. The Marx Creek chum spawning channels have been constructed, adding over a mile of new spawning habitat for these magnificent fish. Fish Creek gravels have also been cleaned of sediments deposited from the floods of 1960's. In cooperation with the recreation staff on Misty Fiords National Monument and the Hyder Community Association, an interpretive display was built to tell the story of the Fish/Marx Creek chum.

The chum habitat enhancement projects have also been monitored extensively, and a coded wire tag program has been implemented to evaluate the number of chum fry leaving the Fish/Marx Creek system, numbers intercepted by the commercial fishers, and numbers returning to the watershed, to better understand how the Fish Creek chum can be managed for the benefit of all user groups.

Island Run King Salmon. King Salmon River and Wheeler Creek populations of king salmon are island genetic stocks. No other naturally-occurring runs of island king salmon stocks are known to exist in Southeast Alaska (S. Kessler, personal communication, U.S Forest Service, 1990). King Salmon River and Wheeler Creek are both within Admiralty Island National Monument Wilderness. Information on these populations is limited. The King Salmon River stock serves as an important king salmon transplant source for other streams and rivers.

THREATENED, ENDANGERED, CANDIDATE, AND SENSITIVE SPECIES

ENVIRONMENTAL CONSEQUENCES

This section focuses on the effects alternatives will have on habitats and/or populations of threatened, endangered, candidate, and sensitive species. Consultation procedures and other requirements of the Endangered Species Act, as amended, are in progress with the U. S. Fish and Wildlife Service and the National Marine Fisheries Service.

Whales

Since the eight species of endangered whales are totally associated with the marine environment, the primary focus in evaluating effects of the alternatives will be on those management activities associated with the marine environment. These management activities are the development and use of log transfer facilities (LTF's) and their associated camps, the movement of log rafts from log transfer facilities to mills, and the potential development of other docks and associated facilities for mining, recreation, and other forest uses and activities. Generally, with the development and use of LTF's and other docking facilities for projects, there is an associated increase in recreational boating in the immediate vicinity during the construction and use of the facilities.

Most of the information and data for whales in Southeast Alaska is associated with one species, the humpback whale, because it is the most abundant whale to occur in Southeast Alaskan waters. The other seven species of whales are either only present seasonally as they migrate along the outer coastal areas, or are only occasionally found in the inside coastal waters of Southeast Alaska. The following discussion and analysis is primarily based on humpback whales, but is assumed to be applicable to the other species of whales also.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Construction and operation of LTF's and other docking facilities are restricted to small, very localized areas of the marine environment. There are 116 LTF's currently on the Tongass National Forest. There is an estimated 227 acres of marine benthic disturbance associated with these existing LTF's. Not all of the LTF's are active at the same time. Table 3-98 displays the total number of new LTF's anticipated with each alternative that should be constructed over a 50 year period, and the estimated acres of marine benthic (ocean bottom) disturbance associated with the new LTF's. Additional information on LTF's is provided in the transportation section of this chapter.

TABLE 3-98
TOTAL PROPOSED LTF'S AND ACRES OF MARINE BENTHIC DISTURBANCE FOR EACH ALTERNATIVE (CONSTRUCTED OVER THE FIRST 5 DECADES)

	Alternatives						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Proposed LTF's on the Tongass National Forest	73	118	145	153	80	135	136
Acres of Marine Disturbance with New LTF's	143	231	284	300	157	265	267

Generally there is no reasonable potential to directly affect whales with these facilities. During the summer of 1989, there was a report of a humpback whale entangled in some cables from an inactive LTF site on the Stikine Area. To our knowledge, this is the only direct effect incident related to LTF's.

Two potential indirect effects of LTF's and other docking facilities and associated activities have been identified: 1) effects on whale prey species, and 2) disturbances of whales by boat traffic associated with LTF's.

Effects on Prey. Nemoto (1970) noted that euphausiids and gregarious fish are the primary prey of humpbacks. Thirteen species of fish and 57 species of invertebrates were identified as humpback whale prey in Southeast Alaska. Humpbacks studied in Glacier Bay and Stephens Passage-Frederick Sound were found most frequently in areas of high prey density (Wing and Krieger 1983).

Construction and operation of all LTF's and similar facilities require U.S. Army Corps of Engineer and U.S. Environmental Protection Agency permits, and State of Alaska Tidelands permits. The permitting process ensures that construction and operation would not degrade water quality in the specific facility locations, and that marine circulation and flushing is maintained. All facilities must be in conformance with permit standards. No impacts to the marine environment which would affect whale prey species are anticipated.

Effects from Disturbance. Humpback whale response to nearby boating activity varies from no apparent response to pod dispersal, sounding, breaching, evasive underwater maneuvers, and maintaining distance (Baker and Herman 1983, Baker et. al. 1982). Disturbance by boat activity has been suggested as one of the possible causes of observed changes in whale distribution in Southeast Alaska. Direct pursuit of whales by boats, and frequent changes in boat speed and direction appear to elicit avoidance behaviors more frequently than other types of boat traffic. However, whales may readily habituate to constant and familiar noise (Norris and Reeves 1978). Whales can be commonly found in

some areas of Southeast Alaska which have considerable boat traffic, and are likely habituated to the current level of vessel use and pursuit by whale watchers and photographers.

Two basic types of boat activity would be associated with LTF's: log raft towing and recreational boating by workers. Log raft towing frequency would vary between camps, seasons, and years; a general average may be about once a week during the working season (U.S. Forest Service, 1989-94 Operating Period for the Ketchikan Pulp Company Long-term Sale Area). Tugs would maintain relatively constant speeds and directions during raft towing. Constant speed and direction elicit less avoidance behavior from whales than other types of boating activity. Log raft towing routes are generally well established, and adverse effects from log raft towing have not been documented.

Recreational boating activity would vary between seasons, years, and camps of different sizes. This activity would be concentrated near LTF sites, other docking facilities and camps. It is estimated that most recreational boating would occur within a few miles of the site, few trips would be made over 10 miles, and activity greater than 30 miles from a site would be negligible. This boating would involve frequent changes in speed and direction and may include some small amount of whale pursuit, if the whales are within sight of the camp or an occupied boat. The effect of such recreational activity on whales would depend on many factors such as size of the bay, depth of the waters in the bay, number of boats, individual behavior responses of the whales, etc. At the present time, there is not a quantifiable way to estimate these possible effects.

Table 3-98 displays the estimated number of LTF's and marine disturbance for each of the alternatives. Alternatives which have the highest number of LTF's will most likely have the highest probability of having indirect disturbance effects on whales. Not all of the LTF's will be active at one time, which will reduce the total disturbance effect.

The amount of human activity in the marine environment associated with Forest management activities is only a fraction of the total amount of human activity occurring in the marine environment. Other human activities occurring in the marine environment include commercial fishing, sport fishing, hunting, subsistence, tourism, mariculture, and many others. These activities are not regulated by the Forest Service.

RELATIONSHIP WITH OTHER AGENCIES & PLANS

The National Marine Fisheries Service has responsibility for threatened and endangered species of whales. At present, they are working on a draft recovery plan for the humpback whale. No other recovery plans are in process for other whales which may frequent Southeast Alaska. No critical habitat has been designated for whales in Southeast Alaska.

The National Marine Fisheries Service is currently working on regulations for how close humans can approach marine mammals. The purpose of these regulations is to reduce disturbance to marine mammals from activities such as whale pursuing. Such regulations would reduce the indirect disturbance effects discussed above.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended and 50 CFR 17.7) are used with the National Marine Fisheries Service on all projects within areas used by whales.

Direct effects on whales from implementation of any of the alternatives are not anticipated. Indirect effects may be associated with possible increased disturbance of whales. These indirect effects would be localized in nature, and would be highly variable depending on many factors. Adverse or cumulative effects on whale populations or their habitats are not anticipated with any of the alternatives.

Peregrine Falcons

The American and arctic peregrine falcons occur in Southeast Alaska only during migration. The primary reason for past declines in peregrine falcon populations was the proliferation of organochlorine pesticides, especially DDT and its principle metabolite DDE (Ratcliff 1969, Peskall 1976, Cade et al. 1971, Peskall and Kiff 1979, U.S. Fish and Wildlife Service 1982). No organochlorine pesticides are authorized for use on the Tongass National Forest.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

During migration through Southeast Alaska, the availability and abundance of prey species will most likely be the primary habitat factor affecting peregrine falcons. In coastal areas of Washington, the primary prey species for peregrine falcons were shorebirds and waterfowl species; passerine birds were also identified in the diet (Anderson and Debruyn 1979, Anderson et al. 1980). It is assumed that this would also be the case for coastal Alaska.

Peregrines forage over open sites such as over bodies of water, marshes, grasslands, shorelines, and over wooded areas. Peregrines attack flying prey from above or by chasing them. Although they forage over wide areas, they also have preferred foraging sites (White 1974).

Actual migration routes and patterns, and foraging areas have not been identified for these two subspecies of peregrines in Southeast Alaska. Standards and guidelines have been developed for protecting seabird rookeries and waterfowl concentration areas. A wide variety of passerine (perching and song) birds will be available from a wide variety of natural open and forested communities, and also from a variety of successional stages created by logging. All alternatives will provide for adequate prey abundance and availability for migrating peregrine falcons.

RELATIONSHIP WITH OTHER AGENCIES & PLANS

The U.S. Fish and Wildlife Service has responsibility for the threatened and endangered species of peregrine falcons. Recovery Plans have been developed for the Pacific States peregrine falcon population but do not include Alaska (U.S. Fish and Wildlife Service, 1986), and the Interior Alaska populations (U.S. Fish and Wildlife Service, 1982). No critical habitats have been designated in Southeast Alaska.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended and 50 CFR 17.7) are used with the U. S. Fish and Wildlife Service on all projects within areas thought to be used by these two subspecies of peregrine falcons.

Adverse effects on American and Arctic peregrine falcon populations or their habitats are not anticipated with any of the alternatives.

CANDIDATE SPECIES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Plants. Of the eleven species of candidate plants, five are currently listed as category 3c or 3b. These species are considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, or they are considered taxonomically invalid. No adverse effects are anticipated on these species with any of the alternatives.

Of the six Category 2 candidate plant species, five are now recommended to be listed either as category 3c or 3b (Murray and Lipkin, 1987). No adverse effects are anticipated on these species with any of the alternatives.

The plant, *Thlaspi arcticum* is currently listed as a Category 2 plant species. This species is known to occur in only one location in Southeast Alaska. In all alternatives, this location is allocated to prescriptions within the Natural Setting group, which would maintain roadless and undeveloped characteristics. No adverse effects on this plant specie are not anticipated with any of the alternatives.

Glacier Bay Water Shrew. Other than the documentation that the Glacier Bay water shrew exists at Point Gustavus, Alaska, no other information is available; nothing is known about its distribution, population status, or habitat requirements. Point Gustavus is part of Glacier Bay National Park. Point Gustavus is also adjacent to private land. The nearest National Forest land is Pleasant Island to the south and the Excursion Inlet area to the east. In all alternatives, Pleasant Island is allocated to the Natural Setting prescription group, which maintains roadless and undeveloped characteristics. The Excursion Inlet Area is allocated to a combination of Natural Setting and Moderate Development Prescription groups; in riparian areas, the Stream and Lake Protection Management Prescription will apply. If the Glacier Bay water shrew is similar to other water shrews, it will be associated primarily with riparian habitats. Application of the Stream and Lake Protection Management Prescription will provide a variety of

habitat conditions ranging from old-growth forest conditions to early successional stages, depending on channel types. This range in habitat conditions should provide for the habitats needed by the Glacier Bay water shrew if it exists on National Forest Lands.

North American Lynx. Low prey populations on the mainland appear to be the factor influencing lynx populations on the mainland. Timber harvesting is not likely to greatly influence prey populations to the degree that lynx populations would be affected, either positively or negatively. Trapping seasons, which are regulated by the Alaska Department of Fish and Game, likely have a dominant effect on lynx populations in Southeast Alaska.

Marbled Murrelet. Research is currently underway along the west coast to identify the habitat needs of the marbled murrelet. Current research has identified nesting habitat to be large conifers (Marshall 1988). Figure 3-21, and tables 3-40 and 3-41 document the amount of old growth which will be remaining on the Forest with each alternative. This data suggests that enough old growth habitat will be retained with all alternatives to provide for viable populations. In areas with more timber harvesting, the amount of nesting habitat for murrelets will be reduced. However, the factors currently limiting marbled murrelets in Southeast Alaska have not been identified. The total relationship between old growth habitat available for nesting and marbled murrelet populations is unknown at this time.

SENSITIVE SPECIES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Osprey. Limiting factors for osprey populations are unknown, but availability of nest sites and foraging areas do not appear to be limiting. Standards and guidelines have been developed to provide for protection of nest sites as they are identified; these standards and guidelines apply to all alternatives. Additional knowledge gained through research and monitoring will be needed to develop an increased data base for managing osprey habitat. If factors currently depressing population growth can be identified and managed for, all alternatives will provide habitat for increased populations of osprey.

Peale's Peregrine Falcon. The U.S. Fish and Wildlife Service maintains a data base with confidential locations of all known nest sites of Peale's peregrine falcon in Southeast Alaska. Standards and guidelines which apply to all alternatives have been developed to provide protection for nest sites and prey species (seabirds and waterfowl). No organochlorine pesticides (which cause egg shell thinning) are authorized for use on the Tongass National Forest. Implementation of the standards and guidelines is expected to prevent adverse effects on Peale's peregrine falcon populations and habitats.

Trumpeter Swans. At the present time, the only documented nesting habitat for trumpeter swans on the Forest is at Yakutat. Table 3-99 shows how the general

areas at Yakutat where trumpeter swan nest sites are located has been allocated to four prescription groupings for each alternative.

TABLE 3-99
ALTERNATIVE LAND ALLOCATIONS FOR AREAS OF LAND AT YAKUTAT WHICH CONTAIN TRUMPETER SWAN NEST SITES. [1]

Alternative						
A	*B*	*C*	*D*	*E*	*F*	*G*
W/N	N	N/M	N/M/I	W/N	N	N

[1]Prescription groupings are as follows: W = wilderness or recommended wilderness; N = natural setting; M = moderate development; I = intensive development.
Source: Revision Database Q260, April 1990

Factors that limit trumpeter swan populations are unknown. Nesting, brood rearing and wintering habitats for trumpeter swans are associated with streams, rivers, lakes and ponds. Standards and guidelines have been developed to protect them. As such, all areas will also be managed with standards and guidelines for the stream and lake protection prescription, unless the areas are allocated to more restrictive management prescriptions. Additional research and monitoring are needed to identify the factors which may currently be limiting to swan populations. Implementation of the standards and guidelines, coupled with additional research and monitoring, is expected to prevent adverse effects on trumpeter swan populations and habitats in all alternatives.

Northern Pike. The five lakes containing northern pike are recommended for designation as a Research Natural Area (Pike Lakes) in six alternatives (A,B,C,E,F,G). Such a designation will maintain this area in its current natural state. In Alternative D, the general area around Pike Lakes would be allocated to the timber production prescription; however, the immediate area around the lakes would be allocated and managed with the stream and lake protection prescription. Road access exists within 1/2 mile of the lakes. Alternative D may provide some additional access, but there is no land suitable for timber harvest immediately around the lakes; access or timber harvesting would not have any direct effect on the Lakes. No adverse effects are anticipated with any alternative on the habitat or the populations of northern pike. Fishing regulations will play an important part in ensuring that no overharvesting of these pike populations occurs.

Large Chum Salmon. The habitat for the large chum salmon in Fish Creek, near Hyder on the Portland Canal, will be allocated to the stream and lake protection or a more restrictive management prescription in all alternatives. No adverse effects from USDA Forest Service management activities are anticipated on the habitat or the populations of these large chum salmon with any alternative. The stocks of large chum salmon are also used for commercial, sport and

subsistence fishing. Enhancement projects have been initiated to increase their spawning habitat. Fishing regulations will play an important part in ensuring that overharvesting of these populations of large chum salmon does not occur.

Island Run King Salmon. King Salmon River and Wheeler Creek habitats for Island Run king salmon are both within Admiralty Island National Monument Wilderness. All alternatives will maintain natural habitat conditions. These stocks, whose eggs are transplanted into other streams and rivers, are also used for commercial, sport and subsistence fishing. Fishing regulations will play an important part in ensuring that overharvesting of Island Run king salmon populations does not occur.

MITIGATION

Forest-wide Direction and Standards and Guidelines to maintain or enhance habitats for threatened, endangered, or sensitive species applies to all alternatives (see Appendix G). A summary of this direction and standards and guidelines is presented here:

Threatened, Endangered Species. Meet the requirements of the Endangered Species Act, as amended.

1. Utilize informal and formal consultation procedures, and conference procedures (which ever is appropriate) with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service for all major construction activities and other forest management activities which may have an affect on federally-listed threatened, endangered, proposed or candidate species population or critical habitat (CFR 50 CFR 17.7).
2. Maintain and/or enhance habitats for the recovery and conservation of federally-listed threatened or endangered species. Implement National and Regional Forest Service policy and direction for management of threatened, endangered, proposed and candidate species (Consult FSM 2670).
3. Support monitoring, research, and inventory work for threatened, endangered, and candidate species. Coordinate with appropriate Federal and State agencies; utilize "challenge cost share" agreements and other partnerships.

Sensitive Species. Implement National and Regional Forest Service policy and direction for the identification and management of sensitive species (Consult FSM 2670).

1. When population or habitat declines for a plant or animal species become a Forest Service concern, evaluate the particular species for approval/ placement on the Regional Sensitive Species List by the Regional Forester.
2. Provide for viable populations of sensitive species by maintaining existing habitat capabilities within known use areas. Where desirable, implement

habitat enhancement projects to increase habitat capabilities and expand species distributions.

3. Prepare species management guidelines for Regional Sensitive Species. Such guidelines shall establish objectives and prescribe management direction, monitoring, and protection for a species based on the species needs over its entire range rather than on a local population or individual site.
4. The status of sensitive species shall be reviewed at least every 5 years. Such status reviews shall recommend whether or not a species should continue to be listed as a sensitive species.
5. In cooperation with other agencies, institutions, and private groups implement a Forest-wide inventory for sensitive plant species. Maintain accurate records on locations of sensitive plants on the Forest.
6. Identify research needs for sensitive plants and animals on the Forest.

Specific standards and guidelines are also provided for the following species, or species groups: trumpeter swan, osprey, peregrine falcon, island king salmon, northern pike, chum salmon in Fish Creek, and marine mammals (See Appendix G.)

TIMBER

AFFECTED ENVIRONMENT

Trees used for commercial harvest are one component of vegetation. Because of their importance as an economic resource and the effects that timber harvest has on the other components of the environment, timber is discussed separately in Chapter 3.

The Affected Environment portion of the timber section addresses timber supply in terms of growing stock (the timber inventory), existing and potential timber supply, and the land base tentatively suitable for growing harvestable timber. Timber management is discussed in terms of silvicultural systems, harvest, long and short-term timber sales, calculation of the allowable sale quantity and economics.

Timber Species

Individual tree species and the species occurrence vary by location, topography, drainage, soil type and stand history on the Tongass National Forest. Western hemlock and Sitka spruce stands cover 98 percent of the land capable of growing industrial wood in Southeast Alaska (Revision Database, 2/90, Q21). The remaining two percent of the forest land supports western redcedar, Alaska-cedar, and cottonwood.

Western hemlock (*Tsuga heterophylla*) is the major single timber stand component, growing on 54 percent (Revision Database, 2/90, Q21) of the total area capable of growing industrial wood products.

Sitka spruce (*Picea sitchensis*), the second largest single stand component, covers 4 percent (Revision Database, 2/90, Q21) of lands capable of producing industrial wood products.

Stands classified as hemlock-spruce (mixed conifer) inhabit 40 percent (Revision Database, 2/90, Q21) of the lands capable of growing industrial wood products.

The remaining timber in most stands, approximately 2 percent (Revision Database, 2/90, Q21) by acreage, is evenly divided between Western redcedar (*Thuja plicata*) and Alaska-cedar (*Chamaecyprus nootkatensis*).

Tree species of limited commercial value include red alder (*Alnus rubra*), shore pine (*Pinus contorta* var. *contorta*), and black cottonwood (*Populus trichocarpa*). Because there is no commercial market for them, these species are not considered industrial wood products.

Forest Inventories

The first Southeast Alaska-wide timber inventory began in 1953 and was completed in 1958. Due to the extensive area to be covered, the inventory was subdivided into Juneau, Sitka, Petersburg/Wrangell, Yakutat, and Ketchikan/Craig working circles. Ten years later, a portion of the original inventory was remeasured to improve estimates of growth and mortality trends in young growth stands in Southeast Alaska (Hutchison and LaBau, 1975). (Young growth stands are defined for timber management considerations as being less than 150 years old and normally less than 20 inches in diameter at breast height.)

A complete reinventory program to reevaluate Southeast Alaska's forest area and volume began in the early 1970's and was completed by 1975. Several new categories of information were collected including data to evaluate level of stocking (the number of existing trees compared to the most desirable number of trees for a site), strata classes (timber categorized by several attributes such as species, decadence, stocking, site index and board feet per acre), soils, multiple-use objectives, slope, better definition of harvest categories, and a redefinition of quality guides. Detailed data, such as risk class and soil microsite, were collected on individual trees to better determine their potential for timber management considerations (Hutchinson and LaBau 1975).

In 1979, an extensive point sampling system inventory developed for the Tongass Land Management Plan gathered specific information across the Tongass to provide specific information for the completed 1970's forest inventory. In the early 1980's, this inventory was redesigned on an Administrative Area basis. Field data collection for this inventory was completed in 1985. Table 3-100 displays a comparison of these inventories.

Existing Timber Supply

Sawlogs. A sawlog is a tree at least nine inches at breast height, capable of producing a log twelve feet in length with a top diameter of six inches, and greater than 33 1/3 percent sound "useable" wood. The net standing supply of sawlogs on the Tongass is about 101 billion board feet. This supply includes timber on non-Wilderness lands only and excludes those areas which are presently identified as Research Natural Areas, Experimental Forests, and Municipal Watersheds. (Table 3-100 - See 1980's Forest Inventory Statistics). The predominant species of standing sawlog volume is western hemlock (65 percent) with Sitka spruce volume accounting for 33 percent. The remaining 2 percent is cedar and other species.

Wilderness lands contain approximately 39 billion board feet of standing sawlog volume. Additional volume outside designated wilderness is approximately 438 million board feet in existing Research Natural Areas, 292 million board feet in Experimental Forest, and 73 million board feet in municipal watersheds. The total standing sawlog volume on the Tongass National Forest is approximately 140 billion board feet on 5.7 million acres of productive forest lands meeting a minimum diameter at breast height of 9.0 inches.

TABLE 3-100
FOREST INVENTORIES COMPARISON (Thousands of acres and Millions of Board Feet)

Area	*Productive Forest Land Area (M Ac.)*	*Productive Forest Land Volume (MMBF)*	*Reserved Area (M Ac.)*	*Nonprod Area (M Ac.)*	*Nonforest Area (M Ac.)*	*Total Land Area (M Ac.)*
Original Inventory - 1950's						
Chatham Area	1,611.3	45,791.3	5.5	2,070.1	3,353.8	7,040.7
Stikine Area	1,018.2	33,100.8		1,327.4	930.0	3,275.6
Ketchikan Area	1,891.5	63,163.4	28.2	2,297.3	1,310.1	5,527.1
Total Tongass	4,521.0	142,055.5	33.7	5,694.8	5,593.9	15,843.4
First Reinventory 1970's TLMP						
Chatham Area	2,307.8	57,403.7		1,508.3	2,614.3	6,430.4
Stikine Area	1,280.1	29,397.0		943.0	769.4	2,992.5
Ketchikan Area	2,520.8	56,995.5		1,830.1	1,181.4	5,532.3
Total Tongass	6,108.7	143,796.2		4,281.4	4,565.1	14,955.2
Second Reinventory - 1980's TLMP						
Chatham Area	1,418.8	32,100.0	792.4	1,464.4	4,467.3	8,157.6
Stikine Area	1,226.8	31,958.4	144.3	1,018.2	1,231.3	3,599.2
Ketchikan Area	1,532.6	37,534.4	627.7	1,818.1	1,245.3	5,244.0
Total Tongass	**4,178.2**	**101,592.8**	**1,564.4**	**4,300.9**	**6,943.9**	**17,000.8**

Source: Alaska's Forest Resources PNW 19, The Forest Ecosystem of Southeast Alaska PNW 34, USDA Forest Service Regional Office Revision Database, 2/90, Q114

Utility logs. Utility logs are defined as logs with less than 33 1/3 percent net sawlog volume (the volume that can be used for industrial wood products) but containing at least 50 percent firm useable pulp chips. The Tongass Land Management Plan addressed utility log volume by identifying an additional 96 million board feet annually in total timber harvest, consumption, and employment estimates (TLMP,1979, page 173). The average annual utility volume harvested from the Tongass for the period 1980-1988 was approximately 48.3 million board feet, representing approximately 14.5 percent of the total harvest from the Forest for the same period (Timber Supply and Demand Report, Draft-1988 Report, 1989).

The Tongass Land Management Plan Revision will follow the same guide as the 1979 Forest Plan. Utility volume will not be included in the Allowable Sale Quantity calculation (the allowable sale quantity is the maximum volume that may be scheduled during the plan period '10-15 years' to meet long-term production while providing for other resources). The Forest Inventory, used as the basis for determining the stand characteristics and yield tables for the

Revision, does not include the utility volume component of the Forest. Utility volume is part of the gross volume and is lumped with all nonmerchantable (cull) volume when calculating net sawlog volume (Planning Record, 1920-2-4 (G-12), November 7, 1988).

Potential Timber Volumes

Old Growth. Old growth is defined for timber management considerations as being over 150 years in age. The amount of volume produced by a timber stand at any given time which meets this characteristic may be predicted through the use of growth and yield tables. (A yield table is a table showing the growth pattern of a timber stand over time).

Table 3-101 summarizes existing conditions on the Tongass. Yield estimates were developed for the Revision using SEAPROG (Southeast Alaska Prognosis Growth and Yield Model). The assumption used in these yield tables and in the Tongass Land Management Plan is that growth equals mortality for old-growth stands. Inventory information continues to support this premise. For this reason, Revision calculations of old-growth yields will remain constant over time. Volumes displayed in Table 3-101 represent existing old-growth net merchantable sawlog volume per acre. Merchantable volume is defined as timber volume capable of being used for industrial wood products.

TABLE 3-101
REVISION YIELD ESTIMATES FOR OLD-GROWTH STANDS
(Net merchantable thousand board foot volume per acre.)

Strata	*Chatham Area*	*Stikine Area*	*Ketchikan Area*
A	14.6	22.0	16.9
B	23.1	23.1	29.4
C	30.5	30.5	29.3
D	35.9	35.9	36.0

Source: Revision planning records.

Second Growth. A stand of trees which have regenerated after overmature timber has been harvested is categorized as a second growth stand. The growth of these stands can be predicted by yield tables similar to old-growth stands. Second-growth yield tables for the Tongass Land Management Plan were adapted from published yield tables for young-growth hemlock-spruce stands in Southeast Alaska (Taylor, 1934). Although these tables were over 40 years old, they were the standard for predicting productivity of *unmanaged* young growth that follows harvesting of Southeast Alaska's overmature old-growth stands at the time.

Yield tables were also developed for *managed* young growth stands. The means by which management of second growth stands was to take place was by the

use of precommercial thinning techniques. Precommercial thinning (thinning stands usually less than 20 years old to improve species composition and accelerate the diameter growth of the trees that remain) was projected to increase the average tree diameters and increase the yield of merchantable wood by the time the trees had reached maturity (at the end of the rotation) (Ruth and Harris, 1979).

The Revision Empirical Yield Tables (included in Appendix L) were developed using the 1980's Forest Inventory data in the SEAPROG (Southeast Alaska Prognosis Growth and Yield Model) program (R10, Timber Management, December 1, 1988). Output volumes were based on net live 32 foot log scale (board foot volume determination) for trees 9.0 inches and larger at their breast diameter (DBH). Yield tables were established for each of the three Administrative Areas. The reason for discrepancies in volume outputs by Administrative Area for the same treatments and site index is explained by greater diameter growth taking place at lower latitudes, differences in species composition, and how the stand prognosis model selects trees to thin or harvest when stand composition is not controlled.

A comparison of the yield estimates between the Tongass Land Management Plan and this Revision shows that volume sustainable over the long-term as estimated for the Revision may be greater than that predicted in the Tongass Land Management Plan. Several factors contribute to these increased yields. The most obvious are (R10, Timber Management, Tongass National Forest Yield Table Comparison, 2/90, Planning Record, 1920-2-4 (G-12-b)):

Modeling. The current Forest Plan was calculated using the Timber RAM (Resource Analysis Model) which uses linear programming techniques to simulate forest growth and harvest. Rotation lengths, access constraints, and silvicultural treatments were set in the model. The Revision is using Version 2 FORPLAN (Forest Planning Model) allowing the model to optimize scheduling.

Productivity. The current Forest Plan assumed existing old-growth stand conditions predicted the productivity of the site for timber. For example, low volume existing stands were assumed to be on low productivity sites when they were regenerated. The current inventory shows that there may not be a direct correlation between existing conditions and inherent productivity of the site. A large number of the existing low and medium old-growth stands are actually on high productivity timber sites according to soils inventory data.

Yield Tables. For a given site, the Tongass Land Management Plan regeneration volume tables predicted more volume per acre than the empirical yield tables being used for the Revision. Model optimization

and a greater proportion of the land base being regenerated on highly productive sites are more a factor in the difference in yields between the Tongass Land Management Plan and the Revision than individual yield tables.

The biological potential yield of the Forest (the amount of timber that could be produced on all forested lands) with no reductions for other resource considerations, technical problems, or workforce requirements, is approximated in Table 3-102.

TABLE 3-102
BIOLOGICAL POTENTIAL YIELD

Land Classification	*Acres*	*Annual Yield (MMBF Net)*
Tentatively Suited	3,053,000	1,086
Withdrawn	2,216,000	90
Unsuited	11,733,000	19
TOTAL	**17,002,000**	**1,195**

Source: 1990 FORPLAN Data, Max Timber Benchmark (Appendix B)

Timber Land Base

Productive Forest Lands. The productive forested land of the Tongass National Forest comprises 5,741,000 acres. Of this, 1,588,000 are located in Wilderness and 4,183,000 are located in non-Wilderness designation. The tentatively suitable acres are derived from the productive, non-Wilderness segment of the Tongass. (Tentatively suitable Forest land is defined as the portion of the productive forested land on which timber harvest can be considered). Table 3-103, Inventoried Old-Growth Acres in Productive Forest Land, displays productive forested lands by their composition, young growth and old growth.

Tentatively Suitable Land Base. Because the Alaska National Interest Land Conservation Act (ANILCA) Section 705 (d) stated that the National Forest Management Act's requirement (Section 6(k)) did not apply to the Tongass National Forest, the original Tongass Land Management Plan did not formally make tentatively suitable lands determinations.)

TABLE 3-103
INVENTORIED OLD-GROWTH ACRES IN PRODUCTIVE FOREST LAND (Thousands of Acres)

Category	*Original Inventory (1950)*	*First Reinventory (1970)*	*TLMP Inventory (1977)*	*Second Reinventory (1980)*	*Revision Inventory (1989)*
Wilderness or Reserved Forest Land	34	-	1,660	-	1,558
Old Growth	34	N/A	1,595	-	1,496
Young Growth	0	N/A	6	-	62
Available Productive Forest Land	4,521	6,109	4,413	4,178	4,183
Old Growth	4,097	5,681	4,076	3,720	3,688
Young Growth	424	428	337	458	494
Total Available Productive Forest Land	4,555	6,109	5,736	4,178	5,741
% Old Growth	91	93	93	90	90
% Young Growth	9	7	7	10	10

Source: R10, Timber Management November 17, 1989 and Revision Database,2/90, Q190

The Tongass Land Management Plan did designate productive forest as unavailable for timber harvest due to other multiple use needs. The special funding provisions of ANILCA Section 705(a) recognized that a portion of the timber supply would be used to make uneconomic timber more attractive by supplemental funding. Legislative history indicates that the actual intent of ANILCA Section 705(d) was to prevent impounding funds which would be needed to implement the Tongass Land Management Plan (Backiel and Baldwin, 1987). The Revision will follow the requirements for suitability analysis (36 CFR 219.14). (See Appendix K for a detailed description of the process used to identify tentatively suitable lands for the Revision; and Analysis of the Management Situation, Timber Section p. 3-419).

There are 3,053,000 acres of tentatively suitable forest land on the Tongass. Designated Wilderness is not included in this base. The acres determined as tentatively suitable are displayed in Table 3-104 and Figure 3-40, Tongass National Forest Land Base.

TABLE 3-104
TENTATIVELY SUITABLE LAND CLASSIFICATION

	Not Suitable (acres)	Total (acres)
Total National Forest Area		17,002,000
Non-Forested Area		7,342,000[1]
Fresh Water (lakes, ponds, etc.)	270,000	
Saltwater (lagoons, inclusions)	79,000	
Developed for purposes other than timber production	14,000	
Roads	13,000	
Non-forest lands	6,966,000	
Forested Lands or Lands Capable of Being Forested		9,660,000[1]
Capable of being forested	315,000	
Not capable of growing industrial wood products	49,000	
Irreversible damage likely to occur	851,000	
Regeneration difficulty	97,000	
Inadequate response information	3,046,000	
Withdrawn forest lands		
Existing Wilderness	2,216,000 [2]	
Existing Research Natural Areas	18,000 [2]	
Existing Experimental Forest	12,000	
Municipal Watersheds	3,000	
Tentatively Suitable Forest Land		3,053,000

Source: Revision Database, 2/90, Q21, Q31, Q108 & RX1A

[1]The tentatively suitable process uses the soils and vegetative layer of the GIS database. This combination of data sources accounts for 388 thousand acres less of forested lands than if only the vegetative layer is selected. Total forested land from the vegetation layer query is 10,037 million acres. The tentatively suitable process uses 9,649 million acres as the forested base.
[2]13,867 acres of Research Natural Areas also occur in Wilderness. Total Research Natural Area acres are shown. Add 13,867 acres to the Wilderness designation to get total acreages.

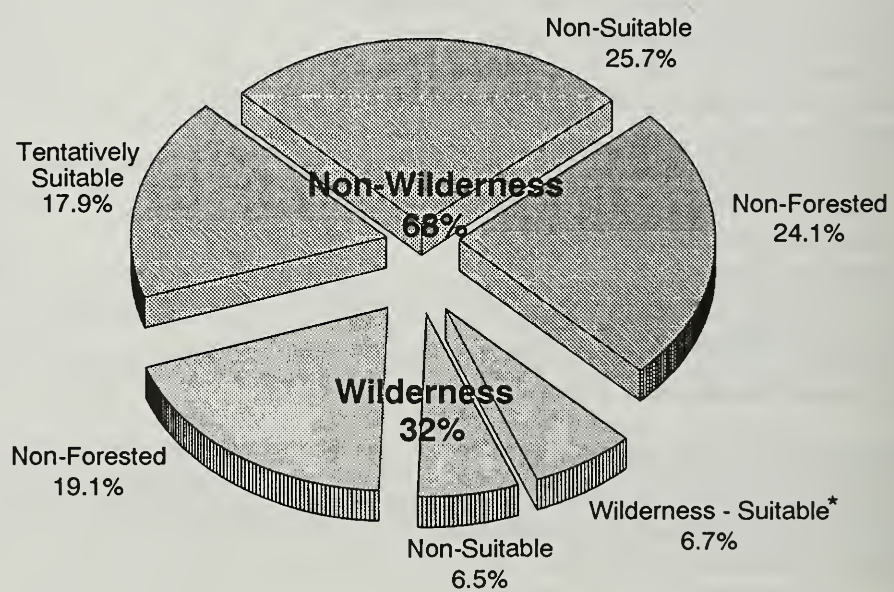
Tentatively suitable forest lands are those identified as having the biological capacity and availability to produce industrial wood products. To be considered as tentatively suitable, the forested land must:

a. be at least 10 percent occupied by trees or have formerly had such tree cover, and not be develop for non-forest uses;
b. be capable of harvest with available technology to ensure timber production without irreversible resource damage to soils productivity or watershed conditions;
c. be capable of being restocked within five years after final harvest; and
d. not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Lands within designated Wilderness on the Tongass that would meet the criteria for tentatively suitable timber are approximatly 1,134,106 acres (See Analysis of the Management Situation, 1/90, Supply-The Land Base, page 3-451). Calculation of this acreage is approximate due to soils data not being available for most of the Tongass's Wilderness areas. Soils inventories have been completed on the Stikine Area's Tebenkof and Petersburg Creek/Duncan Salt Chuck Wildernesses. The information from these wildernesses were used to approximate the total for all 14 Wilderness areas (Analysis of the Management Situation, 1/90, Timber, page 3-451).

FIGURE 3-40

TONGASS NATIONAL FOREST
LAND BASE - FEBRUARY, 1990
17.002 MILLION ACRES



Source: Revision Database, 2/90 - Q31

* Meets Criteria for Tentatively Suitable Lands with Exception of Wilderness

Figure 3-41, Tentatively Suitable Acres by Size Class and Operability Distribution, displays the land base considered for timber harvest activities in the categories listed as defined by the Revision Database. Table 3-105 displays the relationship of land areas for the 1979 Tongass Plan, the Plan Amendment (85-86), and the Revision. The primary reasons for the differences in the acreage approximations is a result of ANILCA additions, land transfers, land acquisitions and Native and State selections within the Tongass National Forest boundaries since 1979.

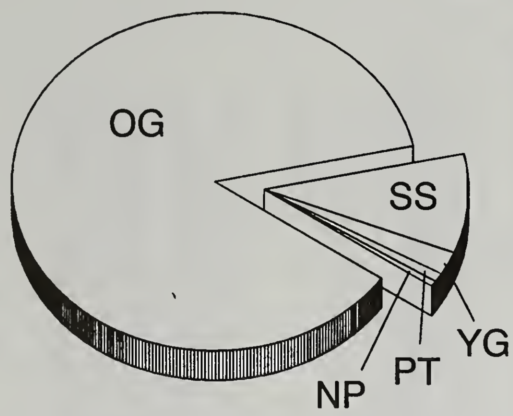
FIGURE 3-41

TENTATIVELY SUITABLE FOREST LAND BY SIZE CLASS AND OPERABILITY CLASS

3.053 MILLION ACRES

Fig A

Acres

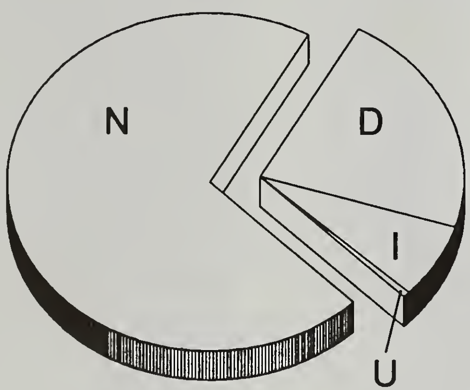


Tentatively Suitable Size Classes

Size Class	Diameter	Acres
Old-Growth Saw Timber (OG)	>20"	2,659,000
Young-Growth Saw Timber (YG)	9.9 - 19.9"	74,000
Pole Timber (PT)	5.0 - 8.9"	22,000
Seedling/Sapling (SS)	0.0 - 4.0"	285,000
New Plantations (NP)	0.0 - 0.0	14,000

Fig B

Acres



Tentatively Suitable Operability Classes

Operability Class	System	Acres
Normal (N)	T, HL, SS *	2,161,000
Difficult (D)	Hel, LS, MS * *	659,000
Isolated (I)	All	72,000
Unclassified (U)	--	15,000

* T, HL, SS - Tractor, Highlead and Shortspan Skyline

* * HEL, LS, MS - Helicopter, Longspand Skyline and Multispan

TABLE 3-105
COMPARISON OF CURRENT PLAN INVENTORIES WITH THE REVISION INVENTORY
(thousands of acres)

Category	1977 Inventory (M Acres) 1/	Updated 1985 Inventory (M Acres) 1/ 2/	Revision Inventory (M Acres)
Total Tongass Land Area	15,189	16,707	17,002
Nonforest	5,705	7,300	7,342
Nonproductive Forest Land	3,792	3,671	3,401
Not Suitable Forest Lands or lands capable of being forested			955
Productive Forest Land			
Withdrawn/Wilderness	1,646	1,660	
Roadless	532	495	
Retention	273	273	
Irreversible damage likely to occur	851,000		
Withdrawn Forested lands in: (Productive and Non-Productive)			
Wilderness			2,216
Research Natural Areas			18
Experimental Forests			12
Municipal Watersheds			3
Available Forest Land (Productive Lands >8 MBF/Ac)			
Not Operable	917	978	
Operable Forest Land			
Not Scheduled			
Scheduled			
Tentatively Suitable (Non-Wilderness)			3,053

Sources: [1]TLMP Points Database [2]1985 Tongass Land Management Plan Amendment
[3]Revision Database, 2/90, Q31, Q108, Q21, RX1A

Silvicultural Systems

A silvicultural system is a planned sequence of treatments for controlling the species composition and structure of the vegetation during the life of a stand. A stand is a community of trees sufficiently uniform to be distinguishable as a silvicultural or management unit. A stand can be defined as a reasonably homogeneous unit that can be clearly differentiated from surrounding stands by its age, composition, structure, site quality, or geography.

A silvicultural system typically includes cutting trees, growing new trees, and controlling competing vegetation. Cuttings are classified as regeneration (those that help replace stands), and intermediate (those that maintain or improve the character of existing stands, such as precommercial and commercial thinning). Silvicultural systems are adaptations of natural occurrences. Natural "regeneration cuttings" would be accomplished by means of fire, wind, insects, disease and other phenomena, by removing single trees, a small group of trees, a stand, or even a whole watershed.

The clearcutting, seed tree and shelterwood systems are even-aged systems, which means that the their use will create stands where all trees are approximately the same age. The single-tree and group selection systems are uneven-aged systems because natural regeneration following these treatments will differ markedly in age, with at least three major age classes present. Uneven-aged stands have no beginning or end points in time.

Even-Aged Systems. The Tongass National Forest primarily uses even-aged silvicultural systems by use of clearcutting harvest techniques. Alternatives A-G schedule virtually all harvest by clearcutting systems with the exception being found in management area prescription Stream and Lake Protection. In this prescription individual tree selection is employed. Yields from this management area prescription are insignificant in comparison to the other management prescriptions allowing timber harvest.

Harvest practices on the Tongass use clearcutting for the following reasons.

-- Even-aged harvest systems favor plants that respond better in full sunlight (shade intolerant plants). Both Western hemlock and Sitka spruce respond well in open grown areas in cloud-covered Southeast Alaska with the Sitka spruce being more dependent upon the direct sunlight than Western Hemlock.

-- Even-aged systems are a practical control of mistletoe infestations, windfirmness of residual standing timber and species composition. Due to the topography and weather regimes of Southeast Alaska, and biological factors of western hemlock and Sitka spruce, uneven-aged silvicultural systems are not as effective in managing for these conditions.

-- In order to obtain maximum timber yields and growth rates, there must be strict control of the timing of stocking and the number of trees in regenerating even-aged stands. The other option, uneven-aged management, assumes continual replacement of old trees with new. The natural regeneration of uneven-aged stands poses difficulties due to sporadic natural regeneration, brush invasion and competition, climatic and economic considerations, and silvicultural characteristics of Western hemlock and Sitka spruce. Uneven-aged management may be applied for riparian management and maintenance and in visually sensitive areas where reduced timber yields are acceptable in order to meet other important resource objectives.

-- Stand structure in even-aged stands is typically poorly balanced in terms of age (from young to old) and size class (from seedling to mature) distribution, because all trees in even-aged stands are expected to be in the *same* size and age classes. The oldest (or largest) trees in any managed forest depend primarily on the objectives used to manage the forest rather than on the silvicultural systems used to manage it. The amount of old-growth produced or maintained depends more on the willingness to forego their timber volume than the silvicultural systems used to manage them.

-- Due to steep topography, shallow soils, heavy precipitation and terrain found over much of the Tongass, the frequent harvest entry required by uneven-aged systems causes excessive damage to the residual stands. Repeated uneven-aged harvest systems often cause undesirable results: understocked stands, damaged residual timber, entry sites for insects and disease, heavy brush undergrowth, and lower value timber.

Uneven-Aged Systems. The presence of seedlings in uneven-aged climax stands where individual trees or small groups have died is evidence that the selection system might be used in certain situations where timber production is not of major importance. Limited experience, however, has shown that old-growth hemlock-spruce stands have not responded well to selection cutting because residual stands are damaged. Selection cutting may have application where it is necessary to maintain a continuous forest canopy. Examples are campgrounds and other areas of high recreation use, scenic areas, streamside stands, and stands along highways. In these situations, individual mature trees as well as any defective and diseased trees could be removed.

Cable yarding distances must be kept to a minimum to protect residual timber stands. Tree species in Southeast tend to have thin bark and easily removed by impact from moving logs and equipment. Harvest by tractor yarding means causes excessive ground disturbance and is not practical on most soils and topography found on the Tongass. Winter yarding on frozen ground has been

conducted to minimize the impacts to the shallow soils. However, winter yarding techniques are not dependable due to the normally short period of time the ground can be expected to be frozen to the point where damage can be minimized. The amount of volume removed during this period of time is generally low due to the need for snow removal enabling access to the sites, short duration of frozen conditions, and other economic considerations.

Harvest Unit Size. Clearcutting in units of 25-100 acres is the most commonly used harvest-cutting system. Prompt natural forest regeneration usually follows with harvest areas fully stocked, or overstocked, by tree seedlings. (Stocking is the number of trees per unit of area; a fully-stocked stand is one in which the number of trees are optimum for overall tree growth). Most seedlings which originate after cutting are from seed disseminated by surrounding stands. However, some seedlings, usually western hemlock, may become established under a mature stand before it is cut, survive the logging operation, and are released by it. In Southeast Alaska, artificial regeneration by seeding or planting is used only in special situations to increase the proportion of spruce over species of less value or in situations where sites are not expected to regenerate naturally within five years. Control of competing vegetation in addition to planting may be necessary in some areas.

Large clearcuts decrease the length of cutting boundaries exposed to the wind and facilitate selection of windfirm stand borders. Progressive strip cutting toward storm winds helps to reduce wind damage in high-hazard areas. The present trend in harvest unit layout is to select the location, reduce the size, and vary the shape of clearcuts to improve the appearance of harvest-cutting areas. More smaller clearcuts may also provide better wildlife habitat, but may be more subject to windthrow.

Tree Improvement. Increasing demand for timber and concern over management costs, indicate a need to produce more volume per acre per year on fewer acres of the Forest. One method of doing this is to use genetic principles to increase growth, improve tree form and wood quality, and increase resistance to disease, insect, wind damage and animal pests. Genetic improvement can be realized through careful selection of "leave" trees after precommercial and commercial thinnings, and overstory trees in areas not clearcut.

Timber Stand Improvement. Precommercial thinning involves the thinning of very young stands (usually less than 20 years old) to improve the spacing and species composition, to remove surplus, damaged or diseased trees, and to optimize the growth of the remaining trees until the next harvest cycle. The enhanced growth increases the expected timber board foot volume at the next harvest cycle. This in turn increases the future timber inventory and could allow for raising the current harvest level. This increase in the current harvest level is often referred to as the "Allowable Cut Effect" (ACE).

In developing the Tongass Land Management Plan, it was estimated that the allowable sale quantity (ASQ) could be raised by 34 million board feet per year by thinning 6,300 acres annually. Subsequent tests of the Allowable Cut Effect indicate that, if anything, the effect gained from thinning was more than that predicted by TLMP (1985-86 TLMP Amendment, Appendix C).

The acres of timber stand improvement (which is primarily precommercial thinning) have averaged about 5,700 acres per year from 1980-1989.

Timber Harvest

Prior to the early 1950's the average annual timber harvest on the Tongass was about 45 million board feet per year. Since establishment of the long-term contracts around 1952, timber harvest has averaged approximately 361 MMBF per year. This volume has been generated primarily from the Ketchikan, Wrangell and Sitka Unit Sales. Table 3-106, Tongass National Forest Timber Harvest History and Figure 3-42, Tongass National Forest Historical Timber Harvest, depict the annual combined harvest of sawlog and utility volume on the Tongass.

An Allowable Sale Quantity (ASQ) of 4.5 billion board feet per decade was selected for the Tongass National Forest in the Tongass Land Management Plan. An allowable sale quantity is the maximum volume that may be scheduled during the plan period (10-15 years) to meet long-term production while providing for other resources. Since 1980, the average annual volume of timber made available to industry by the Forest Service has been 435 million board feet per year, of which 409 million board feet per year has been actually sold for short-term sales or released for the long-term sales. (When harvest units, approved in the long-term timber sale five-year operating plans Final Environmental Impact Statement and Record of Decision, are appraised and ground verified for harvest, volume is 'released' to the operator). Tongass timber is considered available to industry when it has been offered for sale in short-term sales or units have been released to the operators in the long-term sales.

TABLE 3-106

TONGASS NATIONAL FOREST TIMBER HARVEST HISTORY BY CALENDAR YEAR[1] 1909-89 AND BY FISCAL YEAR[2] FOR THE PERIOD 1952-1989 (SAWLOG AND UTILITY VOLUME)

Calendar Year	*Tongass Volume*	*Calendar Year*	*Tongass Volume*	*Fiscal Year*	*Tongass Volume*	*Harvested Acres by Fiscal Year*
1909		1952	63.4	1952	58.0	1,460
		1953	59.2	1953	49.5	1,340
to		1954	109.2	1954	66.8	1,710
		1955	213.8	1955	179.3	4,530
1916	234.5	1956	230.2	1956	215.8	5,440
1917	41.0	1957	226.4	1957	253.6	7,620
1918	43.1	1958	167.5	1958	195.7	6,080
1919	37.4	1959	266.6	1959	218.3	4,750
1920	45.6	1960	347.5	1960	314.8	8,150
1921	11.7	1961	338.2	1961	347.4	10,170
1922	20.6	1962	366.3	1962	339.2	8,890
1923	40.5	1963	395.1	1963	180.5	5,160
1924	48.6	1964	443.7	1964	415.7	11,520
1925	53.7	1965	397.6	1965	424.6	11,750
1926	51.0	1966	474.3	1966	439.6	10,750
1927	52.0	1967	474.3	1967	450.5	11,300
1928	33.8	1968	529.5	1968	541.3	13,900
1929	42.0	1969	519.3	1969	518.7	13,480
1930	38.5	1970	560.1	1970	493.0	10,910
1931	18.2	1971	527.7	1971	584.2	17,160
1932	14.7	1972	547.5	1972	532.4	13,320
1933	14.7	1973	588.5	1973	590.7	14,850
1934	28.2	1974	544.0	1974	559.6	14,190
1935	30.5	1975	408.4	1975	462.4	11,660
1936	40.0	1976	462.8	1976	444.3	11,210
				1976	109.6	2,770
1937	35.3	1977	447.3	1977	456.3	12,450
1938	25.6	1978	398.7	1978	414.0	12,770
1939	26.5	1979	453.2	1979	422.2	11,180
1940	30.9	1980	452.1	1980	480.1	9,040
1941	35.8	1981	385.7	1981	386.7	7,910
1942	38.5	1982	344.9	1982	370.7	7,610
1943	73.6	1983	251.2	1983	250.5	7,850
1944	86.8	1984	249.8	1984	261.0	3,830
1945	58.3	1985	265.3	1985	231.3	4,590
1946	48.6	1986	271.6	1986	290.5	8,267
1947	83.4	1987	351.5	1987	336.2	8,606
1948	81.0	1988	407.7	1988	396.2	9,677
1949	49.2	1989	408.0[3]	1989	443.1	13,470
1950	54.4	1990	—	1990	—	—
1951	52.9	1991	—	1991	—	—

	Calendar Year 1909-89	Fiscal Year 1952-1989
Total Harvest:	15,669.4 (MMBF)	13,724.3 (MMBF)
Average Yearly Harvest:	193.4 (MMBF)	361.2 (MMBF)

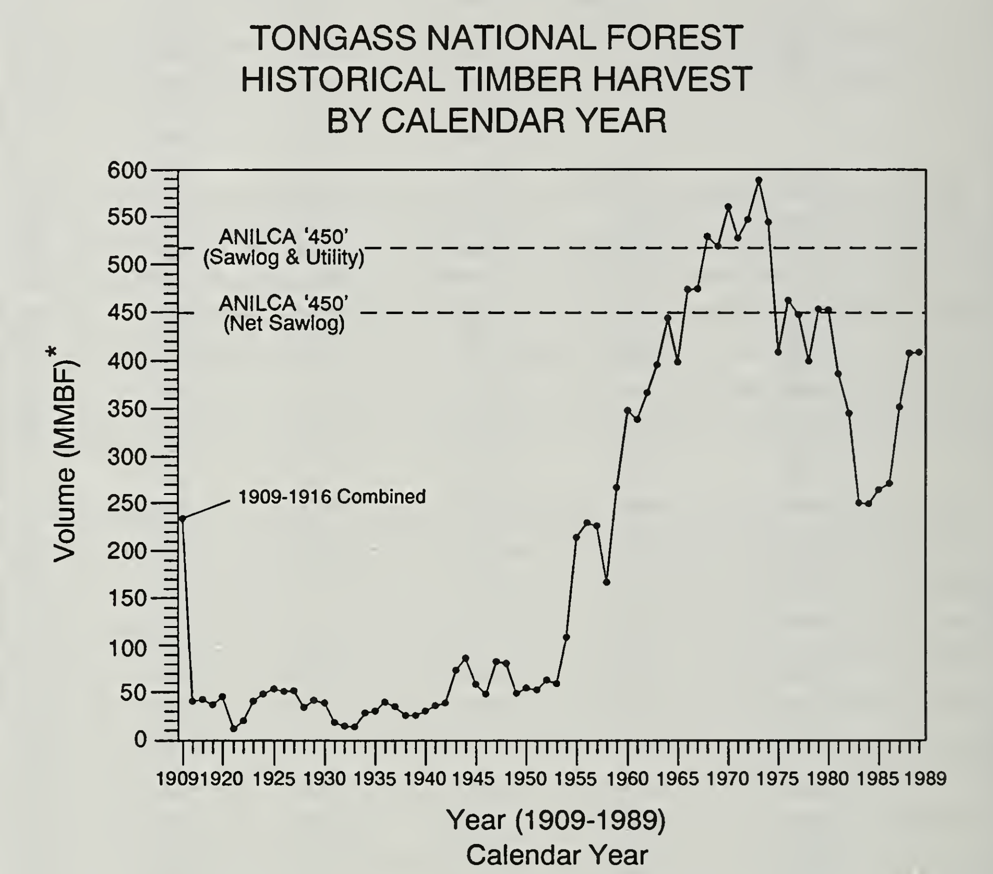
Source: Timber Management, Region 10, October 3, 1989

[1]Calendar Year = January 1-December 31

[2]Fiscal Year = October 1-September 30

[3]Estimated for Calendar Year 1989. First Quarter data for FY 90 not available at time of writing. CY89 Qtr 2=87.9 MMBF; Qtr 3=108.3 MMBF; Qtr 4=148.3 MMBF; Qtr 1 FY 90 estimated at 43.5 MMBF.

FIGURE 3-42



Source: R10-TM, 10/3/89

* Net Saw and Utility Volume by Calendar Year

Table 3-107, Timber Volume Offered, Sold and Harvested FY 80-89, and Figure 3-43, Tongass National Forest Volume, Offered, Sold and Harvested FY 80-89, compares the amount of timber that has been made available, sold, and harvested on the Tongass National Forest since Fiscal Year 1980.

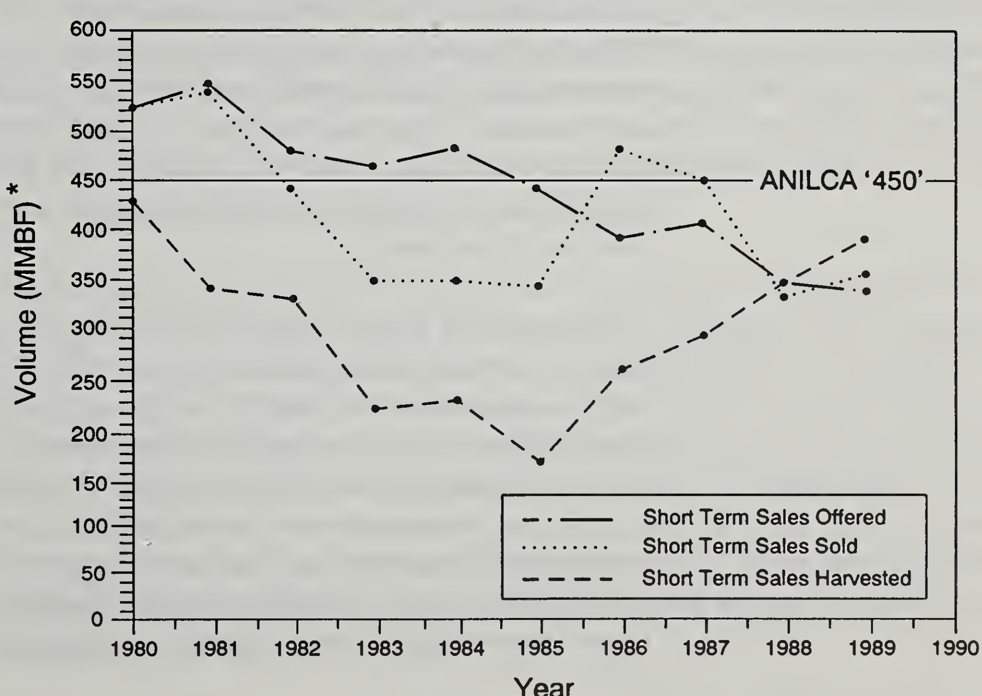
TABLE 3-107
TIMBER VOLUME OFFERED, SOLD, AND HARVESTED FOR FISCAL YEARS 1980-1989 (MMBF)[1]

	1980	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*AVG*
Short-term timber sales program											
Volume Offered	176	151	115	184	178	136	84	98	82	78	128
Volume Sold	173	144	75	69	45	36	174	150	62	86	101
Volume Harvested	114	125	132	46	50	32	50	63	83	126	82
Long-term timber sales program											
Volume Available	347	394	363	275	298	298	298	298	255	243	307
Volume Harvested	314	215	195	174	177	131	201	219	249	251	213
Total Tongass timber sales program											
Volume Offered	523	545	478	459	476	434	382	396	337	322	435
Sold/Available	520	538	438	344	343	334	472	448	317	340	409
Volume Harvested	428	340	327	220	227	163	251	282	332	377	295

Source: USDA Forest Service Timber Supply and Demand Report, Report No. 8, 8/89 Region 10, Program, PLanning and Budget, Chart 1, 2/90
[1] Net MBF Sawlog Volume

FIGURE 3-43

TONGASS NATIONAL FOREST VOLUME OFFERED, SOLD & HARVESTED (1980-1989)



Source: USDA, FS, Timber Supply and Demand, 8/89
Tongass NF, Cut and Sold Report, 1/90

* Net Sawlog Volume by FY

Since depressed timber markets in 1982 created a reductions in demand for National Forest timber products (GAO Report, 1988), the Forest Service had prepared more timber for harvest than could be sold. The timber industry could not afford to purchase timber sales with limited contract lengths and, in some cases, could not afford to harvest timber already under contract with the Forest Service. Due to NEPA, permitting requirements of the State of Alaska and other Federal agencies, and budget constraints, timeframes for preparing timber sales may be up to ten years. Many sales ready for offer after 1982 had originated in the early to mid-1970's. Market, industry needs and budget commitments during that time did not anticipate the sudden downturn in demand experienced during the early 1980's. Much of the volume offered in the early 1980's and not sold was purchased in the latter part of the 1980's when markets began to recover.

In response to the lower demand and harvest of Tongass timber between 1982 and 1986, the Forest Service modified its timber harvest and roading policies. The objective of the current timber sale program is to balance timber supply with the anticipated needs of purchasers, including construction of public roads and facilities. The current policy for timber sales is to base offerings and road construction on harvest levels for the previous year with adjustments for anticipated changes in the market for forest products.

Harvest Volumes vs. Cruised Volume. Since 1952, the average volume per acre harvested from the Tongass has been approximately 39 thousand board feet per acre (Net sawlog and utility log volume) (Table 3-106, Tongass National Forest Timber Harvest History). In comparison, the 1980 forest inventory for the Tongass identifies approximately 24 thousand board feet per acre net sawlog volume (Table 3-105, Forest Inventories Comparison) with an additional approximated 4,000 board feet per acre utility volume (Revision DEIS, Chapter 3, Timber, Utility Logs Section) for a total of 28 thousand board feet per acre. The difference between harvested volume per acre and inventoried volume per acre can be attributed to:

1. *Differences in volume calculation methods*. The standing timber inventory is based on cruised volume (32 foot log scale). Volume from cut and sold reports which is the basis of the 39 Mbf/acre figure representing harvest, is generated from actual scaled volume where lumber recovery is maximized in smaller increments thus producing greater volume recoveries. The amount of taper in a log has a dramatic effect on potential lumber recovery. Increases in log taper result in lower recovery per cubic foot of log volume but higher recovery per board foot log scale. The effect of taper on recovery is less pronounced in larger diameter logs (Forestry Handbook, Wenger, K.F., 1984).

2. *Volume class harvest approximations*. Approximations of actual volume classes harvested are based on typed polygon data used in the Geographic Information

System (GIS) database (Revision database) for the vegetative layer of the timber resource. Harvest units are normally a subset of one or more polygons which encompass one or more stands within the polygon. If the polygon is typed the same as the harvest unit, then correlation can be expected between the volume harvested and the inventoried volume, given considerations for difference in volume determination techniques. More often than not, harvest units are identified around sub-stands of the typed polygons with varying volumes per acre than what is identified for the polygon as-a-whole. In the case of a polygon typed as volume class 4 (Strata A), several different volume classes may be contained within this polygon. Selection of harvest units would normally be in the more economical volume thus having a higher volume recovery than identified in the polygon typing (Timber Stand Characteristics, Brickell, 1989).

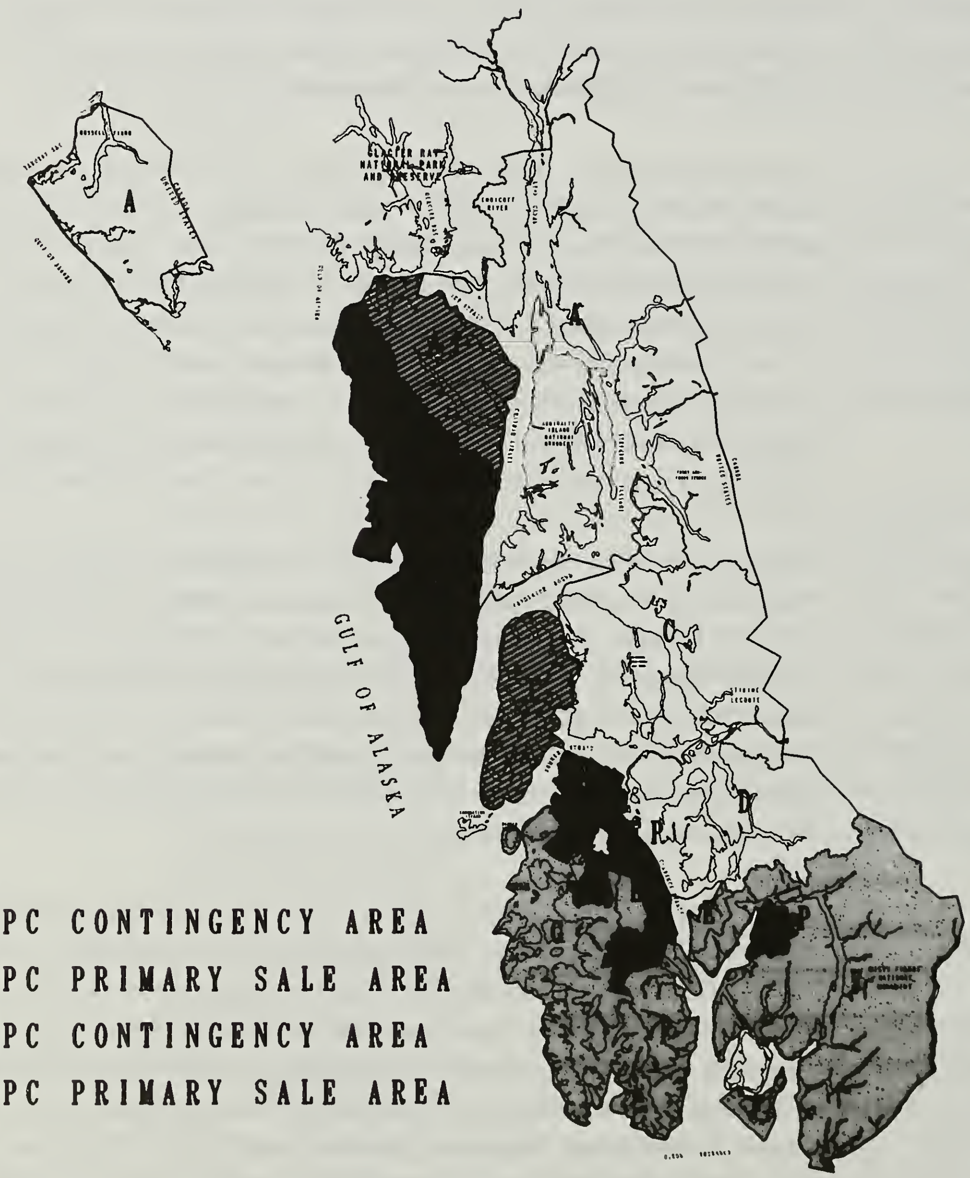
Long-Term Sales. During the 1920's, the Forest Service proposed long-term sales to begin establishment of a pulp industry in Southeast Alaska. It was not until 1951 that the first successful sale was made. During this time period the U.S. Forest Service offered four long-term timber sale contracts. It was assumed that to attract the timber industry to Alaska, a long-term assured supply of timber was necessary. All four sale contracts were initially of 50-years duration and required pulp mill construction. To establish the industry, the U.S. Forest Service was committed to spending much more on Southeast Alaska timber sales than was netted by receipts from those sales (Backiel and Baldwin, 1987).

Two of these 50-year timber sale contracts are no longer operating. The US Plywood-Champion Paper in the Juneau unit was cancelled by mutual consent in 1976. No operations had been performed on-the-ground. The Pacific Northern Timber Company (PNT) Contract located on the Wrangell Unit required the construction of both a sawmill and pulpmill. This requirement was reduced to the construction of a sawmill only, and the contract was shortened to 25 years. All ground activities for the Wrangell Unit were completed in 1981 (R10, Timber Management, Contract Files).

The remaining two contracts still operate on the Tongass. Holders are the Ketchikan Pulp Company (KPC), a wholly-owned subsidiary of the Louisiana-Pacific Corporation, and the Alaska Pulp Corporation (APC), an American Corporation owned by Japanese interests. Figure 3-44, Long-Term Timber Sale Contract Boundaries, identifies the original sale areas encompassed by the two remaining contracts. As stipulated in their contracts, each company built a pulp mill, Ketchikan Pulp near Ketchikan and Alaska Pulp near Sitka. In return, the government assured KPC and APC a total of about 13.3 billion board feet of timber over a period of 50 years. The KPC contract expires in 2004 and the APC expires in 2011.

FIGURE 3-44

APC, KPC LONG TERM SALE AREAS



MAP TM-1

DRAFT as of 21 May 90

Table 3-108, Long-Term Timber Sale Contracts of the Tongass, displays the four long-term timber sale contracts made on the Tongass National Forest after 1950, their original contract lengths, date of execution, original volume, volume remaining as of October 1, 1988, and the termination dates of these contracts.

TABLE 3-108
LONG-TERM TIMBER SALE CONTRACTS OF THE TONGASS NATIONAL FOREST

Unit	*Ketchikan Unit*	*Sitka Unit*	*Wrangell Unit*	*Juneau Unit*
Operator(s)	KPC/LPK	ALP/APC	Alaska Wood Products/PNT	U.S. Champion Plywood
Length of Contracts	50 years	50 years	50 years then reduced to 25 years by Regional Forester	50 years
Contract Date	7/26/51	10/15/57	6/9/54	9/12/68
Original Volume (BF)	8,250,000,000[1]	4,974,700,000	693,107,000	8,750,000,000
Remaining Volume (BF) 10/01/88	3,177,037,000 (Sawlog & Utility)	2,668,681,000 (Sawlog Only)	-0-	-0-
Contract Termination	6/30/2004	6/30/2011	12/31/81 [2]	terminated

Source. R10 Sales' Contract Files

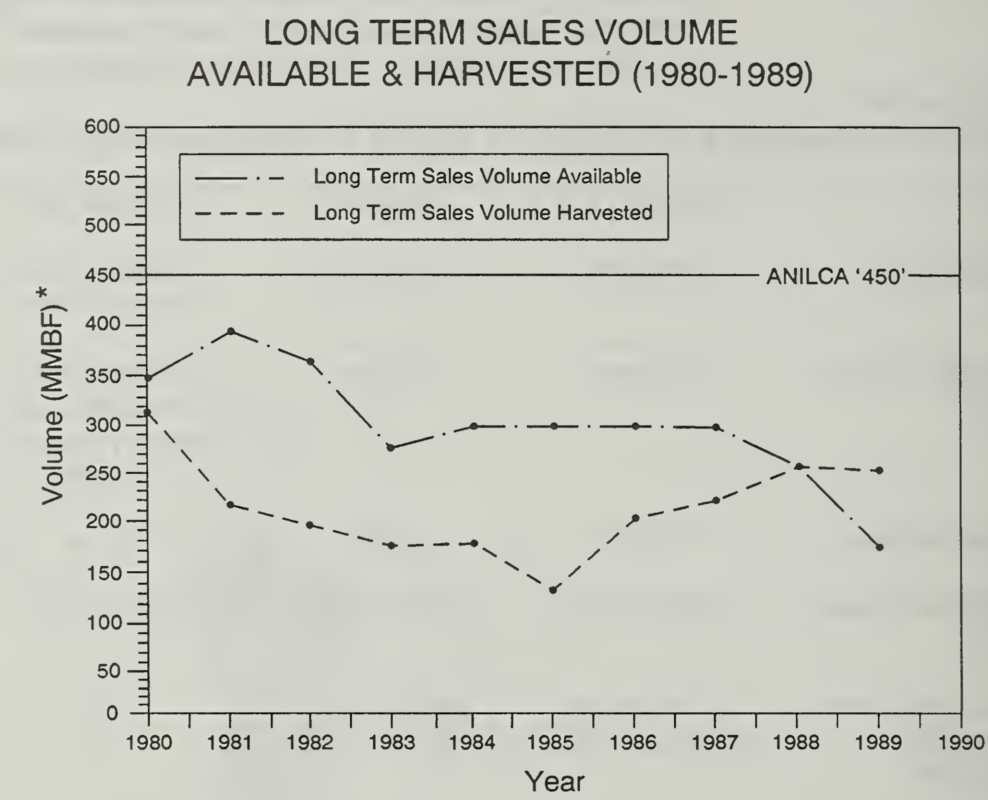
[1]Original sale was for net sawlog volume only. In 1984 Utility volume was added to the contract.

[2] PNT Sale activities on-the-ground completed in 1981. Contract not closed at present due to appeal pending by purchaser concerning redetermined rates for the last five year period.

Long-term sales make up about two-thirds of the timber volume available each year on the Tongass. Since fiscal year 1980, an annual average of 300 million board feet of net sawlog volume has been made available to the long-term contracts. Of this, due to market fluctuations since 1980, an annual average of only 213 million board feet of net sawlog volume has been harvested. In addition to the sawlog volume, approximately 14.5 percent additional utility log volume (31 MMBF) has been harvested under long-term contracts for the same period.

Figure 3-45, Long-Term Sales Volume Available and Harvested, compares the amount of timber released and harvested on the long-term sales since fiscal year 1980.

FIGURE 3-45



Source: USDA, FS, Timber Supply and Demand, 8/89
Tongass NF, Cut and Sold Report, 1/90

* Net Sawlog Volume by FY

Short-term timber sales. An average of 128 million board feet of net sawlog timber has been offered in short-term timber sales since 1980. (Short-term timber sales are those sales which range in duration from a few months to seven years with volumes ranging from single trees to 50 million board feet.) Of the 128 MMBF, 101 million board feet have been sold annually, and 82 million board feet have been harvested.

In 1977, the U.S. Forest Service began making 80 million board feet of net sawlog volume available annually in short-term sales for small businesses only. These sales were intended to promote opportunities for small timber businesses and are free of competition from large firms. The Small Business Association (SBA) set-aside program, defines small businesses as those businesses with no more than 500 employees. Part of the short-term timber sales program, SBA set-asides, represent almost one-third of the net sawlog volume annually available from the Tongass National Forest.

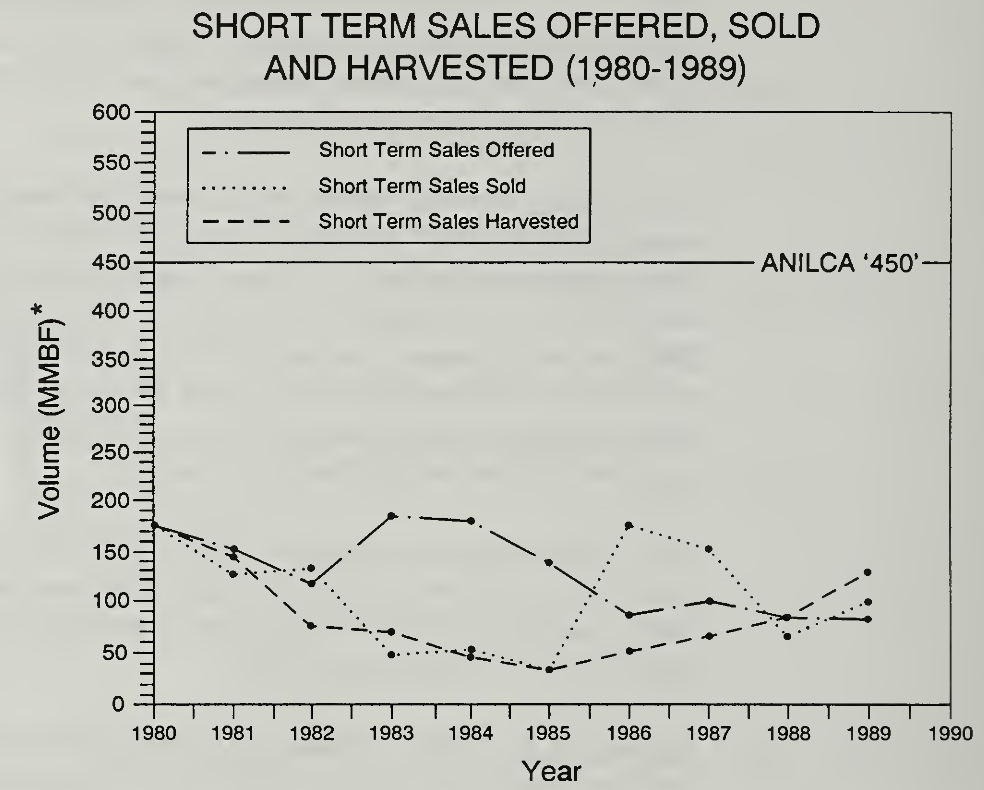
Since 1980 an average of about 95 million board feet of net sawlog volume per year has been offered annually through the SBA set aside program. About 53 million board feet of this volume was purchased between 1980 and 1987 (ANILCA, Status of the Tongass Report, 1987).

Figure 3-46, Short-Term Timber Sales Offer, Sold and Harvest, FY 80-89, compares the amount of timber offered, sold and harvest from short-term timber sales since fiscal year 1980.

Free Use Timber. The Tongass National Forest allows free use timber, fuelwood and other products, with the exception of green-standing sawtimber, to be gathered from federal lands without permit. This timber is provided for residents of the State by request, at a rate of 10 thousand board feet (MBF) of sawtimber or 25 cords of wood annually. Firewood is the primary use of this timber with houselogs, lumber and floatlogs being other use.

Sources of free use products are found primarily along existing road systems or beaches adjacent to federal lands. Beach logs are found around pulp mills and rafting routes. In towns where mills do not exist, rafting of timber is limited, and road systems are not extensively developed adjacent to Federal lands (e.g., Juneau), free use products are limited or not available. In these areas, overharvest of these limited resources can be a management problem.

FIGURE 3-46



Source: USDA, FS, Timber Supply and Demand, 8/89
Tongass NF, Cut and Sold Report, 1/90

* Net Sawlog Volume by FY

Allowable Sale Quantity Verification. During the development of the Tongass Land Management Plan, an allowable sale quantity (ASQ) of 4.5 billion board feet was calculated for the first decade (1980-1989). This calculation was based on the amount of commercial forest land made available by the plan and reflected anticipated land status changes such as wilderness designation, land transfer, and the Tongass Timber Reform Act. The 1984 Tongass Evaluation Report identified the need to verify the ASQ in light of the many changes that had occurred since its original calculation.

The conclusion drawn from this verification effort was that the changes described in the Tongass Evaluation Report had not adversely affected the original allowable sale quantity calculation of 4.5 billion board feet per decade (4.65 billion board feet less 0.15 million board feet held in reserve for anticipated land selections). However, the land status changes and corrections to the planning model have resulted in minor changes in each Administrative Area's contribution to the overall allowable sale quantity. Slight changes in the distribution of the programmed harvest by volume class were also necessary. The current Administrative Area contributions to the allowable sale quantity are displayed in

Table 3-109. (See the Tongass Plan, 1985-86 Amendment, Appendix C, Table 7 for detailed display of volume class contributions by Administrative Area).

TABLE 3-109
VERIFICATION OF THE TLMP 4.5 MMMBF PER DECADE ASQ

Administrative Area	*Volume* (in billion board feet)	*Remarks*
Chatham Area	1.206 MMMBF	(1.301 MMMBF less 95 MMMBF held in reserve for land selections)
Stikine Area	1.091 MMMBF	None
Ketchikan Area	4.500 MMMBF	(4.595 MMMBF less .095 MMMBF held in reserve for land selections)

Timber Sale Economics. Below-cost timber sales has recently surfaced as an issue among many members of the public. A below-cost sale is one in which total U.S. Forest Service costs exceed revenues. There is currently much discussion on how to analyze available timber sale information so that an assessment of below-cost sales can be made. Areas of particular concern include the type of analysis (i.e., cash flow or cost efficiency), the scope of analysis (i.e., Forest-wide, area-wide, individual projects, per acre or some combination), the timeframe of the analysis (i.e., annual or multi-year), and which benefits or revenues and costs should be included.

The Tongass National Forest operates under a series of statutes requiring certain land management practices that may not result in net returns to the Treasury. These include the Multiple-Use Sustained Yield Act, the National Environmental Policy Act, the National Forest Management Act, and the Alaska National Interest Lands Conservation Act. the U.S. Forest Service policy is to provide a timber program that is above costs. This means costs to prepare, offer and administer timber sales do not exceed timber revenues. Some individual sales may be deficit, while, as a whole, the program may be positive.

The recently developed Timber Sale Program Information Reporting System (TSPIRS) presents a comprehensive picture of the financial, economic, and socio-economic aspects of managing the Tongass timber program. This system provides a single year "snapshot" within the integrated long-term resource management program proposed in the Forest Plan. The annual TSPIRS data is used to measure the financial efficiency of the Tongass timber sale program. Table 3-110, Tongass National Forest TSPIRS, displays TSPIRS data for the years 1987-1989 (the first three years of the program).

TABLE 3-110
TONGASS NATIONAL FOREST TIMBER SALE PROGRAM INFORMATION REPORT
(Thousands of dollars)
< > denote negative numbers

		FY 87	FY 88	FY 89
REPORT 1	Total Revenue	5,905	10,977	21,111
	Total Costs	14,536	12,606	14,893
	Gain/Loss Before State Payments	<8,631>	<1,629>	6,218
	Payments to the States	0	256	4,989
	Gain/Loss After State Payments	<8,631>	<1,885>	1,229
REPORT 2	PRESENT VALUE BENEFITS			
	Timber	2,374	2,821	25,972
	Wildlife	-	271	0
	Recreation/Wildlife Utilization	192	108	27
	Commercial fish	398	486	3,913
	TOTAL Present Benefits	2,964	3,686	29,912
	NEGATIVE EFFECTS			
	Wildlife	-	71	612
	Fisheries	-	30	0
	TOTAL Negative Effects	-	101	612
	PRESENT VALUE COSTS			
	Timber	2,419	2,157	18,200
	Wildlife	160	0	0
	Commercial Fish	117	35	822
	Roads	-	81	47
	Recreation	-	0	0
	TOTAL Present Costs	2,696	2,273	19,069
	PRESENT NET VALUE	268	1,312	10,231
REPORT 3	Employment (Jobs)	2,305	3,385	3,859
	Income	105,000	118,000	120,000
	Value of Federal Income Tax	16,000	-	24,000
	Payments to States (M and MM $'s)	0	256M	4.9 MM
	Total Timber Volume Harvested (MMBF)	336	396[2]	444[3]
	Regeneration Acres Treated	890	5,314	7,908
	Precommercial Thinning Acres	8,819	-	2,414
	Total New Road Construction[1] (Mi)	75	104	106
	Total Road Reconstruction [1](Mi)	51	35	51

Source. Region 10, PP&B, TSPIRS 1987-1989 Data
[1]Miles of road from MARS report that support only the timber program
[2]Includes 332 MMBF of net sawlog volume and 64 MMBF of utility
[3]Includes 337 MMBF of net sawlog volume and 67 MMBF of uitlity

Timber Supply, Capacity, and Demand

National/Regional. The principal projections used in guiding the development and evaluation of long-range plans and programs for management of the National Forests are contained in the latest Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment (i.e., the 1984 Update and the President's Statement of Policy, September 19, 1986). These 50-year projections focus on the long-term in 10-year increments and do not recognize short-term local and regional fluctuations. Although the RPA projected softwood production for the Northwest Regions (including Alaska) shows a decline and then a leveling off after 1990, it is important to examine the Southeast Alaska situation in detail.

Supply

Local. The supply of wood products to the timber industry in Southeast Alaska has averaged approximately 636.4 MMBF (net sawlog and utility volume) per year between FY 1980 and 1989. This supply of timber has come from the Tongass National Forest, Native, State, and Bureau of Indian Affairs lands with additional wood products being imported from other sources outside of Alaska. Table 3-111 displays the available timber supply during fiscal years 1980-1988.

Table 3-112, Projected Future Timber Supply Sources, displays the projected supply of timber from historical sources to Southeast Alaska if the Tongass continued to supply the same historical percentage of harvest.

Industry Capacity. The current structure of Southeast Alaska's lumber and wood products industry is dominated by five sawmills and two pulp mills. A new sawmill began production in spring 1989 in Ketchikan. These five sawmills and a number of small portable mills produce cants, flitches, and dimension lumber for export. Cants and flitches are semi-processed, rough sawn logs meeting federal primary manufacturing requirements. The two pulp mills produce dissolving pulp for both the U.S. domestic and export markets. Alaska's dissolving pulp (special alpha grade) is produced from wood fibers, and is a basic ingredient for rayon, cellophane, and other specialized industrial and aerospace materials.

TABLE 3-111
TIMBER SUPPLY FROM SE ALASKA, FY 1980-1988 (Million Board Feet, Log Scale)

	1980	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*[4]	*ANN/A*
Tongass NF										
Sawtimber	428.3	339.5	326.6	220.0	226.7	162.5	251.4	282.0	331.5	285.4
Utility [1]	51.8	47.8	43.8	30.0	34.0	69.5	39.1	54.2	64.7	48.3
State of Alaska										
Sawtimber	32.5	38.1	26.2	20.9	14.3	3.3	10.4	16.1	13.5	19.5
Utility	0.5	0.7	0.0	0.1	0.5	0.5	0.2	0.3	0.1	0.3
Native Corporations										
Export Sawlog	83.0	31.6	137.0	249.3	202.3	225.3	295.9	286.1	286.4	199.6
Pulplogs [2]	61.8	35.4	22.3	42.6	56.0	46.6	-0.4	110.0	121.3	55.1
BIA	12.8	4.7	2.8	3.1	1.1	0.1	0.0	0.0	0.0	2.7
SE AK Sawlog	556.6	413.9	492.6	493.3	444.4	391.2	557.7	584.0	631.4	507.2
SE AK Total	670.7	497.8	558.7	565.9	534.8	507.8	596.6	748.5	817.5	610.9
Imports										
Sawlogs	33.0	27.1	3.1	21.1	5.7	7.8	24.4	5.7	0.1	14.2
Pulplogs	0.0	0.0	0.0	2.0	38.0	11.9	22.1	5.1	6.8	9.5
Wood Chips[3]	0.0	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	1.7

Source. USDA Forest Service, Alaska Region

[1]Utility volume includes logs with less than one-third net sawlog volume but contains at least one-half firm usable pulp chips. The Tongass Land Management Plan does not include utility logs or residual chips in the annual allowable sale quantity of 450 million board feet.

[2]Native Corporation harvests from Southeast Alaska are estimated.

[3]Wood chips are converted to log scale at a ratio of 2.7 short tons per million board feet.

[4]FY 1989 Tongass Harvest- Sawlog = 376.1 MMBF and Utility = 67.0 MMBF. Data for other sources not available at this time.

TABLE 3-112
PROJECTED FUTURE TIMBER SUPPLY SOURCES

	Sawlog Volume (MMBF)	*Utility Volume (MMBF)*	*Source*
Tongass National Forest	295	50	1980-89 Average Harvest (AMS, 1/90)
Native	200[1]	30	Predicted Remaining Volume on Private lands (Knapp, 1989)
State	15	2	80% of 1980-88 average harvest on State lands 1980-88 (AMS, 1/90)
BIA	1	0	Estimate based on harvest displayed between 1980-88 (AMS, 1/90)
Imports	15-35	11-31	Range estimated based on imports from 1980-1988 (AMS, 1/90)
Subtotal	526-546	93-113	

Period 1 of the Revision Total = 619-659 MMBF
Period 2 of the Revision Total = 419-459 MMBF[1](Native Harvest Complete)

Source. Analysis of the Management Situation, 1/90, Timber Section-Supply
1/-The 200 MMBF is available for an estimated period of 10 years from remaining timber volume on Native lands (Knapp, 1989). This volume is anticipated to be harvested at a rate of 250 MMBF for the first five years of this decade and 150 MMBF for the second 5 year period. Sealaska would supply approximately 125 MMBF of the total for the entire period, with their lands being harvest within twelve years. This harvest rate could vary, depending on market conditions and availability of other lands acquired.

The pulp and log capacity of the Southeast milling operations are shown in Table 3-113, Southeast Alaska Wood Processing Capacity. This capacity is represented as the maximum available for Southeast Alaska wood processing mills. The actual capacity by which mills have operated in Southeast Alaska between 1980 and 1989 has been influenced by the availability of timber and the markets available for products produced. Years 1988 and 1989 were the only two years during the last ten that supplied sufficient amounts of timber from Southeast to run mills at full capacity. A large portion of this supply was exported as round logs from Native lands and not manufactured in Southeast mills.

TABLE 3-113
SE ALASKA WOOD PROCESSING CAPACITY

(Net Saw and Utility Log MMBF Volume/Year)

Firm	*Pulp Capacity*		*Chip By-Products*		*Sawlog Capacity*
	Log	*Pulp*		*Log Eq*	
	MMBF/yr	*M Tons/yr*	*BDU/yr*	*MMBF/yr*	*MMBF/yr*
Alaska Pulp Corporation	160	192	-	-	-
Ketchikan Pulp Company	190	200	-	-	-
Ketchikan Pulp Sawmill	-	100	-	-	-
Klawock Timber Ak.	-	-	75,000	30	60
Wrangell Forest Products	-	-	120,000	48	100
Ketchikan Pulp-Annette	-	-	67,000	27	100
Chilkoot Lumber Company	-		45,000	18	80
Other Small Mills	-	-	-	-	36
Totals	**350**	**392**	**307,000**	**123**	**476**

Source. USDA-Forest Service, Alaska Region and operator-furnished data.
[1]Includes sawlog and utility grade logs, but does not include residual material from cant and waney mills.
[2]Log and chip material from all sources, National Forest timber, Native timber, and imports from British Columbia.
[3]Formerly Alaska Lumber and Pulp.

Demand. Over 90 percent of the wood pulp produced in Alaska is exported. The solid wood products--logs, cants and lumber--are shipped to Japan, Korea, the Peoples' Republic of China, Taiwan and Canada. The dissolving pulp produced from the hemlock and lower grade spruce logs is shipped to a wider array of markets. For example, in 1988, pulp products were shipped from Alaska to Argentina, Austria, Bangladesh, Belgium, Bulgaria, China, Egypt, France, West Germany, India, Indonesia, Iraq, Japan and six other foreign markets. Approximately 15 percent of the disolving pulp produced in Alaska is shipped to destinations in the continental United States (Analysis of the Management Situation, Timber Section, Demand; p.3-473).

Until 1980, the forest products industry in Alaska exported mainly cants and pulp harvested under long-term sale agreements from the Tongass National Forest. As a result of the Alaska Native Claims Settlement Act and the Alaska Statehood Act, local and regional Native corporations and the State of Alaska

gained a significant volume of merchantable stumpage. The Alaska native corporations began an extensive harvest program. The product mix shifted dramatically during the 1980s as round-log exports increased as a share of the market (See-Analysis of the Management Situation, 1/90, Timber Section, ANCSA, page 3-437).

From 1981-85, comparatively low inflation, strong economic growth, political stability and a surging stock market kept the dollar in high demand making U.S. exports prohibitive to foreign buyers. The more value-added in the U.S., the more prohibitive the cost.

As a result, Pacific Rim countries bought logs from Alaska and made their own lumber and pulp at home (1920, Demand for timber from the Tongass -- Outlook through 2010, June 6, 1989). Since 1985, the average Japanese consumer's purchasing power has expanded enormously and goods produced in Japan are now much more expensive than goods produced elsewhere. Just as the Japanese wanted to import and process logs in the mid-1980's, they are now more eager to acquire production offshore. As a result, Alaskan wood products manufacturers are scrambling for wood and increments to capacity. The Japanese can absorb all the fiber Alaskan firms can process and ship (Planning Record, 1920, Demand for timber from the Tongass -- Outlook through 2010, June 6, 1989).

Following a slight market adjustment in 1990 and 1991, a window of opportunity between 1992 and 2000 is being predicted with the best market ever for Alaskan wood products. This will occur because second-growth stands in the Pacific Northwest, as well as other sources such as New Zealand, Chile and Fiji, will be too young for economical harvest (Planning Record, 1920, Demand for timber from the Tongass -- Outlook through 2010, June 6, 1989).

After 2000, demand for Alaskan wood products deteriorates significantly as the first exotic pine plantations around the Pacific Rim move into full production followed in 2010 by substantial reemergence of the Douglas-fir inventories in western Oregon and Washington (Planning Record, 1920, Demand for timber from the Tongass -- Outlook through 2010, June 6, 1989) .

The outlook for Pacific Rim production and trade suggests that the harvests in Alaska will average between 500-700 MMBF per annum over the next decade. The proportion of Alaska timber harvested on the National Forests in each year will continue to depend on the rate at which private inventories are liquidated. Under any rate of liquidation of private harvest, the share by ownership in the 1990's is expected to look more like the pattern experienced between 1960-1980 when Forest Service harvest provided more than two-thirds of total Alaska harvest (Planning Record, 1920, Demand for timber from the Tongass -- Outlook through 2010, June 6, 1989) .

From another perspective, the Alaska Department of Labor, (May, 1990) is predicting Southeast Alaska to maintain steady growth for the next two years (Alaska Economic Trends, 1990-1991 Employment Forecasts, May, 1990).

The timber and seafood processing components of the manufacturing industry have similar outlooks for the next two years; a slowing rate of growth. On the timber side, logging employment is expected to stay at the 1989's level for 1990 and 1991. Southeast Alaska has been the primary area of timber industry activity in the state. But during the next two years the industry will continue expanding elsewhere in the state while Southeast falls back slightly. Just outside the forecast horizon are two significant events which will determine the future of the timber industry. First is the probability that most of Southeast Alaska's privately owned timber (i.e. those stands owned by Native corporations) will be harvested and that logging employment may fall dramatically when that occurs. The second is the possibility of Tongass timber reform legislation becoming law.

The market demand for timber products from Southeast sources appears to be good for the next ten years; however, supply sources are at present uncertain. The supply of timber from Native lands will begin reductions in harvest levels due to dwindling supplies. The supply of timber from the Tongass National Forest is uncertain due to pending legislation which may reduce the allowable sale quantitiy from that allowed under the current Plan.

TIMBER

ENVIRONMENTAL CONSEQUENCES

The Tongass National Forest has a wide range of timbered conditions. While about 60 percent of the land area is considered forested, less than 20 percent is classified as nonwilderness productive timber lands capable of being managed for industrial wood products. Timber harvest on these lands provide an important economic base for Southeast Alaska. Management of the timber resource can result in significant changes in the Forest ecosystem.

This section discusses the environmental consequences of the alternatives on timber production and harvest. The interrelationships between timber and other effects of alternatives are discussed here as well as in other resource sections of this chapter.

Assumptions Common to all Alternatives

Forest-wide standards and guidelines will be applied to all Alternatives (Appendix F, Management Area Prescriptions and Appendix G, Forest-wide Direction and Standards/Guidelines). These measures are designed to protect resource values such as water quality, fisheries and wildlife habitat, soil productivity, cultural resources, visual quality and recreation.

All alternatives have a mix of even-aged and uneven-aged management. The even-aged management systems have been the primary means of harvest on the Tongass National Forest. Uneven-aged management is prescribed for areas with objectives less compatible with even-aged timber harvest activities (i.e., scenic viewsheds, fish habitat or water quality requirements, stream and lake protection, scenic rivers, and recreation rivers). Opportunities for uneven-age management as the primary silvicultural system are limited by road access and the large amount of land that requires cable harvest techniques. Single tree or small group selection is expensive and in many cases technically impractical. The final selection of the silvicultural system will be made during project implementation based on site characteristics and management objectives. All silvicultural methods of even-aged and uneven-aged management are available for site specific projects to consider.

DIRECT AND

A decadal ceiling of timber supply (allowable sale quantitiy) is proposed in all alternatives. The magnitude

INDIRECT EFFECTS of the effects of the alternatives on the timber resource depend on five factors.

1. The landbase available for timber harvest activities,

2. The intensity of timber harvest activities,

3. The rate at which timber harvest will occur,

4. Existing contracts (both long-term and short-term), and

5. The supply of timber from Southeast Alaska necessary to maintain existing processors.

Harvestable Timber Lands

There are approximately 3,053,000 acres of tentatively suitable forested lands. This is (with few exceptions) the amount of nonwilderness forested lands that have the biologic capability of being managed for the production of industrial wood products. Withdrawn lands from the tentatively suitable land base, in addition to wilderness designation, include existing research natural areas, experimental forests, and enacted municipal watersheds. Figure 3-40, Tentatively Suitable Land Classification, displays the amount of tentatively suitable lands available for consideration for timber management.

For clarification, terminology used for lands associated with timber harvest by alternative is described here:

Tongass National Forest - (17.0 million acres) - Total land area.

Forested lands - (10.0 million acres) - Total forested land including wilderness and non-wilderness, productive and non-productive.

Productive Forest Lands - (5.7 million acres) - Productive Forest Lands (PFL) is synonymous to the current plan Commercial Forest Lands (CFL). Includes stands with volume greater than 8 Mbf/acre in both wilderness and non wilderness).

Tentatively Suitable Lands - (3.1 million acres) - Productive, non-wilderness lands that can be considered for timber harvest.

Available Lands - (1.3-2.3 million acres) - Varies by Alternative. Is portion of Tentatively Suitable each Alternative analyzed for timber harvest activities.

Suitable lands - (0.5-1.75 million acres) - Varies by Alternative. Is the portion of Available lands scheduled for harvest in each Alternative.

Allowable Sale Quantity for each Alternative is based on the suitable acres.

The National Forest Management Act contains management requirements that are common for all alternatives (36 CFR 219.13 and 27). For the Tongass National Forest, these management requirements reduce the tentatively suitable lands an additional 403,000 acres, leaving a potential landbase for timber production of about 2,650,000 acres. Each alternative has the same potential tentatively suitable landbase for timber harvest scheduling. Based on the alternative objectives, the actual acres designated as available for harvest varies by alternative. The available timber land is that portion of the tentatively suitable landbase which is analyzed for timber harvest activities. Alternative A, which emphasizes high-quality fish and wildlife habitat, wilderness and unroaded areas, wild and scenic rivers, scenic quality, and a wide range of recreational opportunities in a natural setting, is at the low end of the timber yield spectrum. Alternative D, which emphasizes an economic timber supply from public lands sufficient enough to meet predicted demand, is at the high end of the timber yield spectrum (Table 3-114, Components of Tentatively Suitable Forest Land Acres by Alternative).

TABLE 3-114
COMPONENTS OF TENTATIVELY SUITABLE FOREST LAND ACRES BY ALTERNATIVE

Alter-native	*Strata*	*Tent. Suitable*	*Avail. Suitable*	*Old Growth*	*Young Growth*	*Harvest Intensity Full*	*Harvest Intensity Reduced*	*Operability Normal*	*Operability Difficult*	*Operability Isolated*
A	YG	330,002	229,110	100	229,010	87,384	141,725	228,329	721	60
	A	1,223,655	477,760	472,019	5,740	141,065	336,695	321,807	114,565	41,388
	B	1,114,171	430,223	426,819	3,403	119,685	310,536	310,486	102,107	17,630
	C	317,264	123,449	121,787	1,661	38,167	85,281	95,309	23,968	4,172
	D	73,721	37,068	36,988	80	13,140	23,928	31,549	4,900	619
		3,058,813[1]	1,297,610	1,057,713	239,894	399,441	898,165	987,480	246,261	63,869
B	YG	330,002	226,275	100	226,175	139,968	86,307	225,294	921	.60
	A	1,223,655	568,556	560,534	8,022	289,755	278,802	371,272	146,049	51,235
	B	1,114,171	508,714	503,809	4,904	265,107	243,605	363,316	123,722	21,676
	C	317,264	146,158	141,175	4,984	75,297	70,862	114,395	27,531	4,232
	D	73,721	39,490	39,429	60	26,008	13,481	33,510	5,321	659
		3,058,813[1]	1,489,193	1,245,047	244,145	796,135	693,057	1,107,787	303,544	77,862
C	YG	330,002	304,893	201	304,682	199,238	105,654	303,472	1,421	0
	A	1,223,655	846,783	848,921	22,016	514,062	356,875	612,851	233,932	0
	B	1,114,171	821,192	817,541	9,839	492,918	334,461	611,592	209,600	0
	C	317,264	262,423	245,293	20,404	149,503	116,192	210,404	52,019	0
	D	73,721	64,778	65,338	140	43,635	21,843	52,757	12,021	0
		3,058,813[1]	2,300,069	1,977,294	322,775	1,399,356	900,713	1,791,076	508,993	0
D	YG	317,016	282,382	200	282,182	235,754	46,628	282,282	100	0
	A	1,223,655	873,759	855,574	18,185	735,627	138,133	559,100	217,487	97,172
	B	1,114,171	806,497	798,409	8,088	667,401	139,095	565,952	196,040	44,505
	C	317,264	231,595	219,676	11,919	183,044	48,554	182,554	42,768	6,273
	D	73,721	59,595	59,475	120	49,830	9,765	49,675	9,121	799
		3,058,813[1]	2,264,492	1,933,334	331,158	1,880,180	384,315	1,648,826	466,817	148,849
E	YG	330,002	291,185	120	291,065	195,512	95,673	280,821	60	0
	A	1,223,655	698,680	700,818	12,500	422,659	290,659	512,969	185,711	0
	B	1,114,171	670,176	669,658	6,685	402,946	273,396	503,125	167,051	0
	C	317,264	205,281	202,671	5,844	126,949	81,565	165,009	40,272	0
	D	73,721	56,293	56,853	120	37,653	19,321	48,574	7,719	0
		3,058,813[1]	1,921,615	1,630,120	291,495	1,185,719	735,896	1,519,761	401,854	0
F	YG	317,016	293,963	140	293,823	196,670	97,292	283,299	60	0
	A	1,223,655	780,999	783,137	13,141	466,917	329,360	561,202	219,797	0
	B	1,114,171	752,198	751,620	6,745	449,901	308,463	558,297	193,901	0
	C	317,264	224,366	221,756	5,844	138,722	8,8876	178,324	46,042	0
	D	73,721	58,394	58,954	120	39,233	19,841	49,334	9,060	0
		3,058,813[1]	2,109,920	1,815,607	294,313	1,291,443	818,477	1,639,799	470,121	0
G	YG	317,016	295,866	140	295,726	197,934	97,932	285,202	60	0
	A	1,223,655	798,317	800,455	13,460	484,203	329,713	573,919	224,398	0
	B	1,114,171	777,634	776,896	6,925	468,395	315,424	576,905	200,729	0
	C	317,264	232,898	230,268	5,861	143,755	92,376	185,555	47,343	0
	D	73,721	62,397	62,957	140	42,395	20,701	51,056	11,341	0
		3,058,813[1]	2,167,112	1,870,716	296,396	1,336,682	830,430	1,681,980	485,132	0

Source: Revision Database Q111D, February 1990.

[1]Includes approximately 6,000 acres of roads that are classified as unsuitable.

The long-term sustained yield capacity (LTSYC) for each alternative is a prediction of the maximum timber volume that can be sustained annually from the available tentatively suitable timber lands on the Forest, consistent with the multiple use objectives of each alternative. For all alternatives, the long-term sustained yield capacity is higher than the allowable sale quantity in the first several decades. This is due to greater yields per acre achieved in managed second-growth stands than in existing old-growth stands.

The differences in long-term sustained yield capacities between each alternative reflects both:

1. The number of acres available for timber management, and

2. the intensity of timber management activities scheduled for those acres.

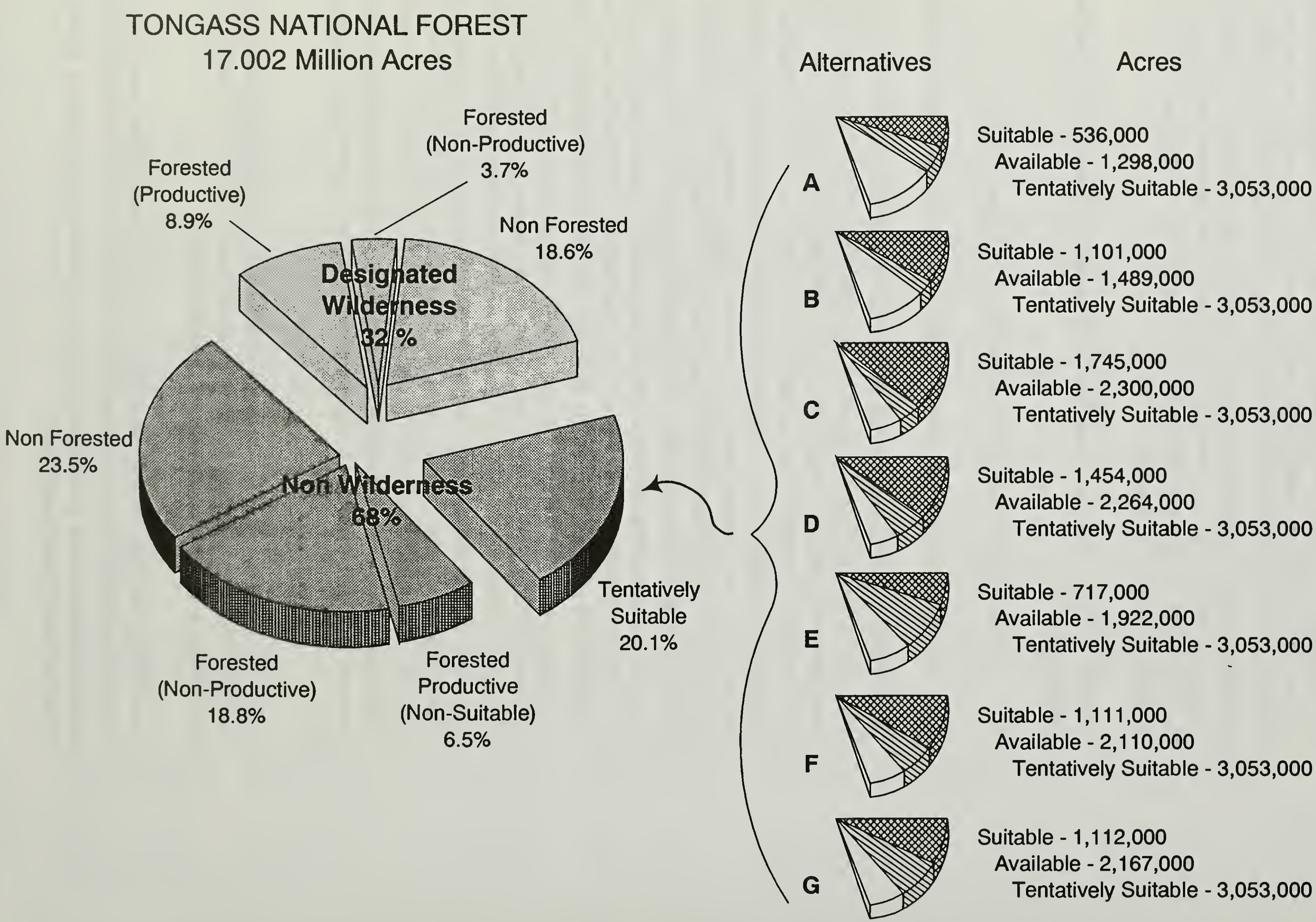
The Allowable Sale Quantity (ASQ) is based on the suitable or scheduled acres selected in the FORPLAN analysis for the Revision DEIS. The suitable acres associated with the ASQ vary by alternative and range from 535,000 to 1,745,000 acres through full rotation. The suitable acres are selected from the available land base acres. Available acres considered for timber management activities are derived from management area prescriptions Scenic Viewshed, Visual-Timber, Roaded Natural/Rural Recreation, Stream and Lake Protection, Scenic and Recreation Rivers, Mineral Management and Timber Management. In all Alternatives, the selected suitable acres do not utilize all harvestable acres available for timber management considerations. Figure 3-47, Alternatives A-G Suitable Land Areas, compares the number of acres by Alternative that are in the tentatively suitable land base, available for timber harvest considerations, and suitable acres scheduled by FORPLAN analysis. Alternative A selects the fewest acres of suitable acres producing an Allowable Sale Quantity of 181 MMBF net sawlog in the first decade. Alternative D, has the highest number of suitable acres with an Allowable Sale Quantity of 550 MMBF net sawlog in the first decade. The Current Plan (1979) originally scheduled more acres (1.75 million) than Alternative D (1.45 million). Reanalysis with current information indicates the Current Plan would only need to schedule 1.2 million acres to achieve the 450 MMBF annual allowable sale quantity.

Table 3-115 displays Average Annual Allowable Sale Quantity (ASQ) both in cubic and board foot measure, Long-Term Sustained Yield (LTSYC) in cubic foot measure, and the acres to achieve each Alternative's ASQ.

The ASQ in board feet (MMBF) declines over time in all alternatives; while the ASQ in cubic feet (MMCF) remains constant. This is due to varying board foot/cubic foot ratios between stands and agency policy of non-declining even-flow based on cubic feet rather than board feet.

FIGURE 3-47

ALTERNATIVE A - G SUITABLE LAND AREAS



Source: Revision Database, 2/90; Q31, Q108, Q190
Revision DEIS FORPLAN Analysis, 2/90

TABLE 3-115

AVERAGE ANNUAL ALLOWABLE SALE QUANTITY (ASQ) AND LONG-TERM SUSTAINED YIELD CAPACITY (LTSYC) BY ALTERNATIVE

Alt	Unit of Measure	Period 1	Admin Area Portion of Period 1 ASQ: Chatham	Stikine	Ketchikan	Period 2	Period 1-5	Period 6-10	LTSYC
A	MMCF[1]	34	1	11	22	34	34	43	51
A	MMBF[2]	181	5	80	96	150	157	202	
A	Acres	5,970	192	2,508	3,270	5,180	5,480	5,180	
B	MMCF	75	16	14	45	75	75	77	101
B	MMBF	354	64	94	196	326	321	340	
B	Acres	12,170	2,710	3,070	6,590	11,670	13,260	12,090	
C	MMCF	88	16	21	51	88	88	90	111
C	MMBF	450	64	167	219	402	397	402	
C	Acres	15,350	2,700	5,150	7,500	13,730	14,180	13,300	
D	MMCF	102	16	31	55	102	102	104	130
D	MMBF	550	64	247	239	460	456	454	
D	Acres	18,540	2,620	8,100	7,820	15,650	15,110	15,830	
E	MMCF	54	2	15	37	54	54	62	71
E	MMBF	280	11	111	159	263	254	285	
E	Acres	9,250	350	3,500	5,400	8,620	8,950	7,940	
E1	MMCF	77	16	16	45	77	77	82	94
E1	MMBF	378	64	118	196	327	344	364	
E1	Acres	13,100	2,700	3,700	6,700	11,627	12,626	9,891	
F	MMCF	80	16	17	47	80	80	83	102
F	MMBF	390	64	127	199	364	360	374	
F	Acres	13,370	2,710	3,960	6,700	12,570	13,310	12,030	
F1	MMCF	83	16	19	48	83	83	87	100
F1	MMBF	420	65	147	208	374	376	385	
F1	Acres	14,400	2,700	4,600	7,100	12,840	13,157	13,304	
G	MMCF	79	16	16	47	79	80	84	102
G	MMBF	390	64	126	200	365	361	375	
G	Acres	13,420	2,650	4,020	6,750	12,580	12,660	9,920	
G1	MMCF	84	16	20	48	84	84	88	102
G1	MMBF	430	65	157	208	383	382	390	
G1	Acres	14,700	2,700	4,900	7,100	13,109	13,369	10,529	

Source. TLMP Revision FORPLAN Reports 3/90. [1]MMCF=Million cubic feet. [2]MMBF=Million board feet

Yield tables were constructed independently for MBF and MCF per acre resulting in variable board foot/cubic foot ratios between existing strata and second growth over time. In existing stands, strata which have higher volumes per acre tend to also have higher board foot/cubic foot ratios. In second growth stands, the board foot/cubic foot ratios tend to get larger as the stand gets older and tree diameters increase.

The stands scheduled in the first decades are those with the highest economic value while meeting the management objectives of the alternative. These stands happen to also have a higher board foot/cubic foot ratio.

The result is that as future stands are harvested with a lower economic value, they also have a lower board foot/cubic foot ratio. Hence board feet harvested over time declines while cubic feet remain constant.

Timber Management Intensity

The intensity of management for an alternative refers to the mix of management area prescriptions available for timber harvest and the silvicultural treatments applied to the acres which are suited for timber harvest activities. Management area prescriptions fit into three basic categories for timber production intensity. These are:

1. Not available for timber production (low),

2. Reduced yields associated with harvest for other multiple-use objectives (moderate), and

3. Full yield where timber management is a primary resource objective (high).

Indicators of management intensity for each alternative are the relative amount of land in timber emphasis management area prescriptions, rotation length, silvicultural system, and overall yield per unit of land area. Description of each management area prescription can be found in Appendixes F and G.

Management area prescriptions that preclude timber harvest include Wilderness, Wilderness National Monument, Non-wilderness National Monument, Research Natural Areas, Beach Fringe and Estuary, Primitive Recreation, Enacted Municipal Watersheds, Old-Growth Habitat, Semi-primitive Recreation, Experimental Forest, Special Areas, and Wild Rivers. Land allocated to these management area prescriptions are considered unsuitable for timber production.

Reduced yield management area prescriptions are suitable for timber production provided that the silvicultural systems are compatible with the management area objective. These include Scenic Viewshed, Visual-Timber, Roaded Natural/ Rural Recreation, Stream and Lake Protection, Scenic Rivers, and Recreation

Rivers (Figure 3-48, Management Intensity by Alternative). Prescriptions for timber harvest for these management areas typically include greater amounts of uneven-age management or extended rotation for even-age management resulting in less than full yield potential.

Management area prescriptions in the category of full yield timber production include Timber Production and Minerals Management (Figure 3-48). More intensive management would normally mean more acres in clearcut harvest systems, larger harvest units, and shorter rotations. In full yield management, there may be more intensive precommercial thinning and other vegetative practices including release of understory stands, and reforestation of specific species of seedlings to improve stand composition.

Management intensity for the full and reduced yield categories is displayed for each Alternative in Figure 3-48, Management Intensity by Alternative.

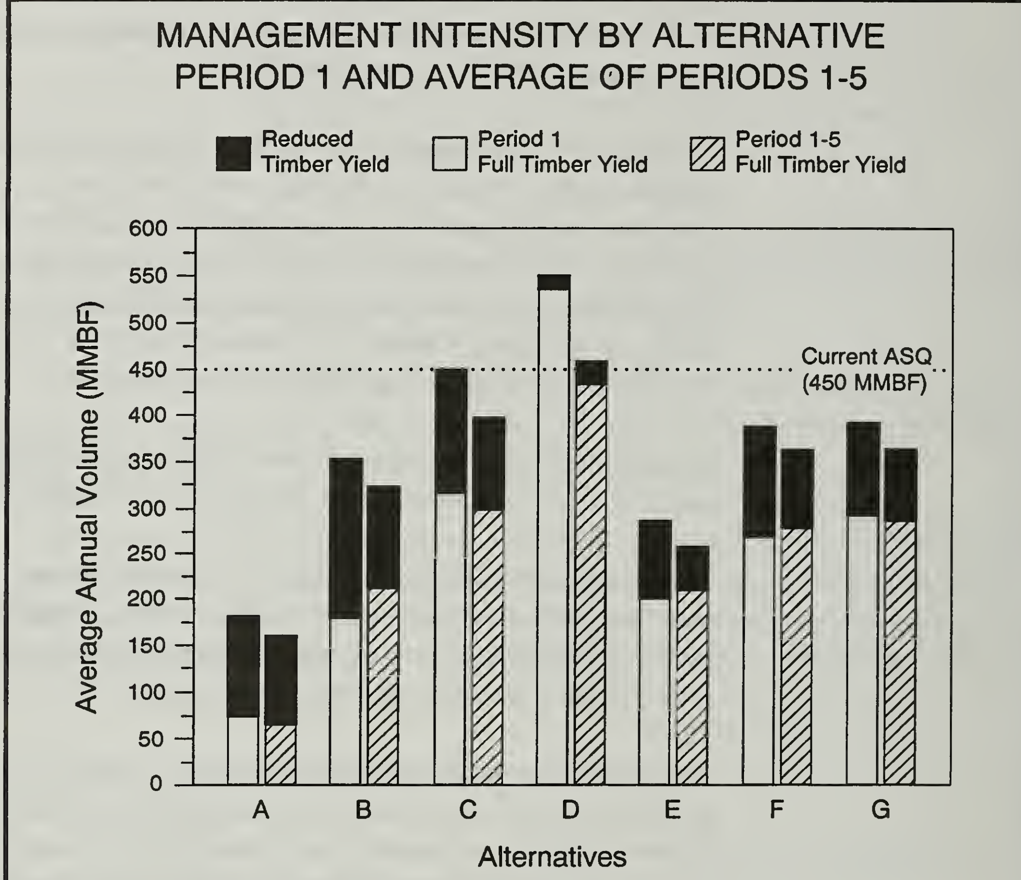
The silvicultural treatments used in the alternatives include clearcut, group selection, individual tree selection, reforestation, release and precommercial thinning. The difference between each alternative is the number of acres to which these treatments are likely to be applied.

Commercial thinning, for timber production measures, is not considered a viable treatment for programmatic planning purposes since it has not been demonstrated to be an effective or economic resource management option of the forest type in Southeast Alaska. This type of management may be beneficial for other resource concerns and could be used to produce a desired vegetative characteristic should the need be recognized during site-specific project planning.

Rate of Timber Harvest

Constraints on rate of harvest affect the rotation length of a timber stand. Rotation length is the number of years from the regeneration of a new stand to the time of its harvest. Generally shorter rotations (around 100 years) are designed to produce wood fiber efficiently or achieve economic objectives. Rotation length for even-age management is no less than 95 percent of the point at which the increment of the increase in volume for a stand has reached its highest mean value (culmination of mean annual increment). Longer rotations (more than 150 years) are used to achieve wildlife, recreation, riparian, visual and other resource objectives. Management area prescriptions are designed to provide for extended rotations by limitations on the percent of disturbance in an area and the length of time before timber is offered adjacent to existing harvested areas.

FIGURE 3-48



Source: Forplan Analysis Alternatives A-G, 3/90
Revision Database, 2/90

Dispersing harvest units spatially is used so that large openings are not created at any one point in time. The size and shape of created openings will likely vary with resource management objectives.

All alternatives generally schedule unconstrained acres (timber production management area prescription) at 95 percent Culmination of Mean Annual Increment (CMAI). More productive sites on the Forest would tend to have a shorter rotation length than those acres associated with lower production. CMAI would be reached sooner on the more porductive sites than the lower. Averaged Forest-wide, the rotation age for the timber production prescription is approximately 100 years. Best returns on growth would be derived from the proper scheduling of regenerated stands.

Acres associated with moderate development (Management area prescriptions: Scenic Viewshed, Visual-Timber, and Roaded Natural/Rural Recreation) have limitations on the amount of disturbance that can occur within the assigned acres for varying periods of time. These acres, would generally be harvested after the 95 percent CMAI is achieved. Averaged Forest-wide, rotation lengths in the moderate development prescriptions range between 140 and 170 years. This would be similar to the current extended rotations scheduled in Land Use Designation III under the current Forest Plan.

Riparian acres were scheduled in the harvest analysis with far greater rotation lengths than any of the other areas available for timber harvest activities. The rotation length for these acres is about 1,000 years. The intention behind such long rotations was to maintain the existing large woody debris availability into the stream systems for maintenance of fish habitat. The amount of timber volume scheduled in these acres on an annual basis is insignificant due to the long rotation lengths.

The actual acres managed on long rotations vary substantially by alternative. Table 3-114, Components of Tentatively Suitable Forest Land Acres by Alternative, displays the amount of tentatively suitable and available acres for each alternative. Alternative A, which emphasizes high quality fish and wildlife habitat and unroaded recreation opportunities, would have the highest proportion of scheduled acres in the moderate (reduced yield) component. Rate of harvest under this alternative is the smallest with the greatest overall rotation length.

In contrast to Alternative A, Alternative D, which emphasizes timber production, has the greater proportion of scheduled acres in the intensive (full yield) management area prescriptions. The rate of harvest under this alternative is the greatest with the lowest overall rotation length.

Existing Contracts

Maintaining existing contracts is dependant on the amount of timber volume scheduled within existing contract area boundaries (See Figure 3-44, Long-term Timber Sale Contract Boundaries). Timber supply must be available within economical distances of manufacturing facilities to maintain the facilities production levels.

The long-term timber sales on the Tongass in operation today are the Alaska Pulp Corporation (APC) Contract with a pulpmill in Sitka, and the Ketchikan Pulp Company (KPC) Contract with a pulpmill in Ketchikan. The APC contract will terminate in year 2011 and is contractually obligated to provide approximately 104 million board feet annually of net sawlog volume from the Tongass. The KPC contract will terminate in 2004 and is contractually obligated to provide approximately 192 million board feet annually of sawlog and utility log volume (historically 169 MMBF sawlog and 23 MMBF utility) (Timber Management Contract Files, Regional Office, 4/90) from the Tongass.

Short-term timber sale contracts account for nearly one-third of the volume offered on the Tongass. Between 1980-1989, nearly 120 million board feet per year was offered for independent short-term sales. About 95 million board feet of the 120 million board feet offered was specified for Small Business Administration (SBA) qualified operators (set-aside sales).

Short-term timber sale contracts generally occur outside the long-term timber sale contract boundaries. Under the existing APC Contract, any offer of timber within the sale area must first be made to APC, then if rejected may be offered as short-term sales. Under the KPC contract, since rejected units are included in the volume for the next unit plan, almost all of the units are eventually harvested by the long-term purchaser.

The allowable sale quantity (chargeable net sawlog volume) and the pulplog volume (non-chargeable utility volume) for the long-term and short-term contracts (outside the long-term contract sale areas) is displayed in Table 3-116, Volume Scheduled by Existing Contract Areas. Since both long-term contracts are scheduled to terminate within two decades, only periods one and two are displayed.

TABLE 3-116
VOLUME SCHEDULE BY EXISTING CONTRACT AREAS
Average Annual Volume

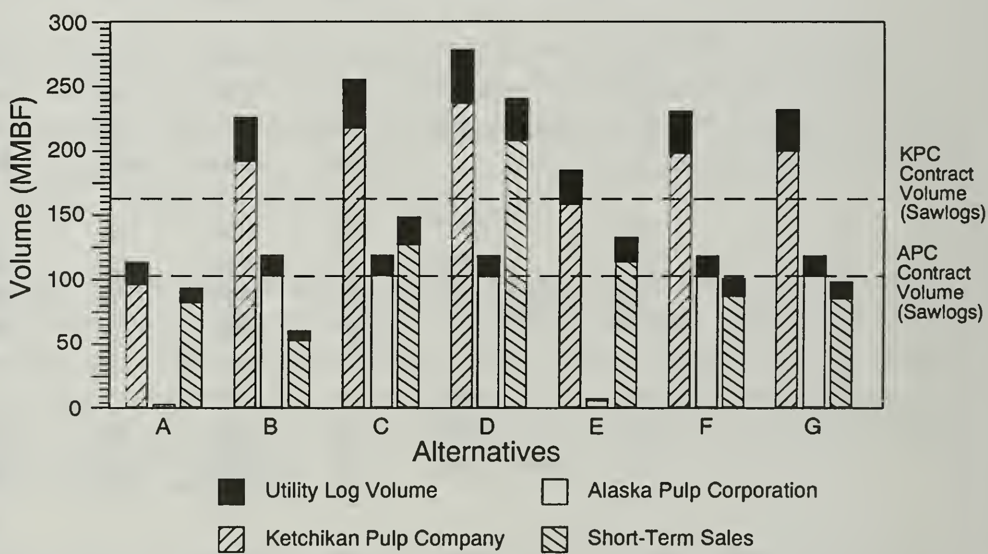
		Period 1			Period 2		
			Sawlog	Utility		Sawlog	Utility
Alt	*Contract*	*MMCF*	*MMBF*	*MMBF*	*MMCF*	*MMBF*	*MMBF*
A	APC	1	2	0	5	23	3
A	KPC	22	96	16	22	91	15
A	Short-Term	12	82	12	7	36	5
		35	**180**	**28**	**34**	**150**	**23**
B	APC	23	104	15	26	104	15
B	KPC	45	194	31	45	196	31
B	Short-Term	8	52	8	5	26	5
		76	**350**	**54**	**76**	**326**	**51**
C	APC	21	104	15	22	104	15
C	KPC	50	219	36	50	206	32
C	Short-Term	16	127	19	14	92	14
		87	**450**	**70**	**87**	**402**	**61**
D	APC	21	104	15	22	108	16
D	KPC	54	238	39	59	240	38
D	Short-Term	26	208	32	20	112	16
		101	**550**	**86**	**101**	**460**	**70**
E	APC	1	6	1	4	16	2
E	KPC	37	159	26	37	154	25
E	Short-Term	16	115	18	14	93	13
		54	**280**	**44**	**54**	**263**	**41**
F	APC	22	104	15	22	104	13
F	KPC	47	198	32	47	196	31
F	Short-Term	11	88	13	11	64	9
		79	**390**	**60**	**79**	**364**	**56**
G	APC	22	104	15	22	104	15
G	KPC	47	200	32	47	196	32
G	Short-Term	10	86	13	11	65	10
		79	**390**	**60**	**795**	**365**	**57**

Source. Revision FORPLAN Reports 3/90

Figure 3-49, Period 1-Scheduled Volume, graphically displays the allowable sale quantity and utility log volume in the first ten years for long and short-term sales. In Figure 3-49, utility volume is displayed (black portion of bars) to show its proportion to sawlog volume. The utility volume is not counted towards the Allowable Sale Quantity displayed in each of the alternatives, however its removal from the sale areas under the contracts is required.

FIGURE 3-49

PERIOD 1 - SCHEDULED VOLUME BY CONTRACT AREA
(SAWLOG AND UTILITY LOG)



SOURCE: Revision Databae, 2/90
Forplan Analysis - Alternatives A-G, 3/90

Alternative A would have insufficient timber supply available within either existing long-term sale area and would likely result in cancellation or significant modification to both the Alaska Pulp Corporation and Ketchikan Pulp Company contracts given present contract requirements. The volume scheduled in Alternative E is also insufficient to maintain both existing long-term sales, but could minimally maintain the KPC contract. If the long-term sales were cancelled in Alternatives A and E, each alternative could maintain a short-term sales program if markets were still available in Southeast Alaska to manufacture timber from the sales. Cancellation of the contracts with APC and KPC does not guarantee that the mills would remain in operation. Alternatives C, D, E1, F, F1, G and G1 could maintain or exceed both the existing long-term contracts and the historic short-term timber sales program. Alternative B could not maintain both the existing long-term and the historic short-term program under current contract conditions and annual harvest levels.

Timber Supply vs. Demand

Southeast Alaska's timber market area is expected to face decreasing timber supply over the next 10-15 years. The decline is based on dwindling timber supply available from Native lands. Native lands could supply as much as 250 MMBF per year for the next five years, declining to 150 MMBF per year for another five years. The majority of the timber volume would be from Sealaska Corporation's harvest operations which could supply as much as 125 MMBF per year for the next 10-12 years (Analysis of the Management Situation, Tongass National Forest, January 1990, pages 3-437 to 3-444). Most of this timber volume decline is in the export sawlog supply. Some of the Native lower grade sawlogs, and an increasing supply of pulplogs, are utilized in the pulp industry and cant market. Based on current market conditions and harvest rates on private lands, within 15 years, the Tongass National Forest will be the major supplier of timber in Southeast Alaska. Supply from other sources will be insignificant and add little to the overall timber program which currently exists in Southeast Alaska.

The wood processing capacity for Southeast Alaska changes as mills open, shut-down, expand, and add or reduce shifts. The two pulpmills have an estimated pulp capacity of 350 MMBF per year (390 million tons) and the sawmills have a estimated capacity of about 476 MMBF per year. This totals 826 MMBF per year full mill capacity. The potential supply of timber volume (sawlog and utility) to Southeast Alaska mills has averaged 640 MMBF per year between fiscal years 1980-1988 (Table 3-111). This average includes sawlogs and utility logs harvested from all owners, as well as imported wood from Canada. Of the total supply, approximately 180 MMBF annually was Native round log export, leaving about 460 MMBF per year supply to local manufacturers. This supply ranges from a high of 620 MMBF in 1980 to a low of 300 MMBF in 1985. Table 3-111 displays supplies of timber volume in Southeast Alaska during the implementation period of the current Forest Plan. The supply has continued to increase since 1985 with 1989 approaching 550 MMBF (77 percent of total mill capacity).

During the first decade of plan implementation, all alternatives provide less average annual timber supply (sawlog and utility) than would be needed to meet the demand for total mill capacity if sawlogs from Native lands continue to be exported. By the year 2000, Native sawlog and pulplog supplies lands are projected to be exhausted except for Sealaska Corporation. If the State continues to supply about 20 MMBF per year and imports account for another 25 MMBF per year, the U.S. Forest Service contribution to maintain the average 1980-1988 supply of 460 MMBF per year would be 415 MMBF annually (352 MMBF sawlog and 63 MMBF utility). Each alternative, except A and E, meets this demand. It should be recognized that the 1980's had one of the more depressed worldwide timber markets in history. For this reason, the 1980-1988 period may not represent future demands. To meet the 1989 experienced demand of 550 MMBF, the U.S. Forest Service contribution would be approximately 500 MMBF (425 MMBF sawlog and 75 MMBF utility log included). Only Alternative C and D would meet or exceed this average annual supply level.

Additional sawlog volume for Alternative E1 (the higher harvest level for E) in the amount of 98 MMBF would raise the Allowable Sale Quantity to 378 MMBF. Including the utility volume, the total volume available from the Tongass National Forest would be about 435 MMBF. This volume would meet the 1980-1988 average supply of timber volume from federal lands used by the mills of Southeast Alaska. However, this volume would be short of that supply used by the mills considering only 1989. Volume distribution with the modified Alternative E1 could supply both the Ketchikan Pulp Company (169 MMBF sawlog and 23 MMBF utility log) and the Alaska Pulp Corporation long-term contracts (104 MMBF sawlog and 15 MMBF utility). The remaining 124 MMBF (107 MMBF sawlog and 17 MMBF utility) would be available for short-term timber sales. The 124 MMBF would be sufficient to meet historic offer under the current Forest Plan.

Including the utility volume, the total timber supply from the Tongass National Forest for Alternatives F1 and G1 on an average annual basis would be about 483 MMBF and 495 MMBF respectively. Timber Supply for both Alternatives would be slightly under the 500 MMBF contribution from the Tongass experienced in 1989.

CUMULATIVE EFFECTS

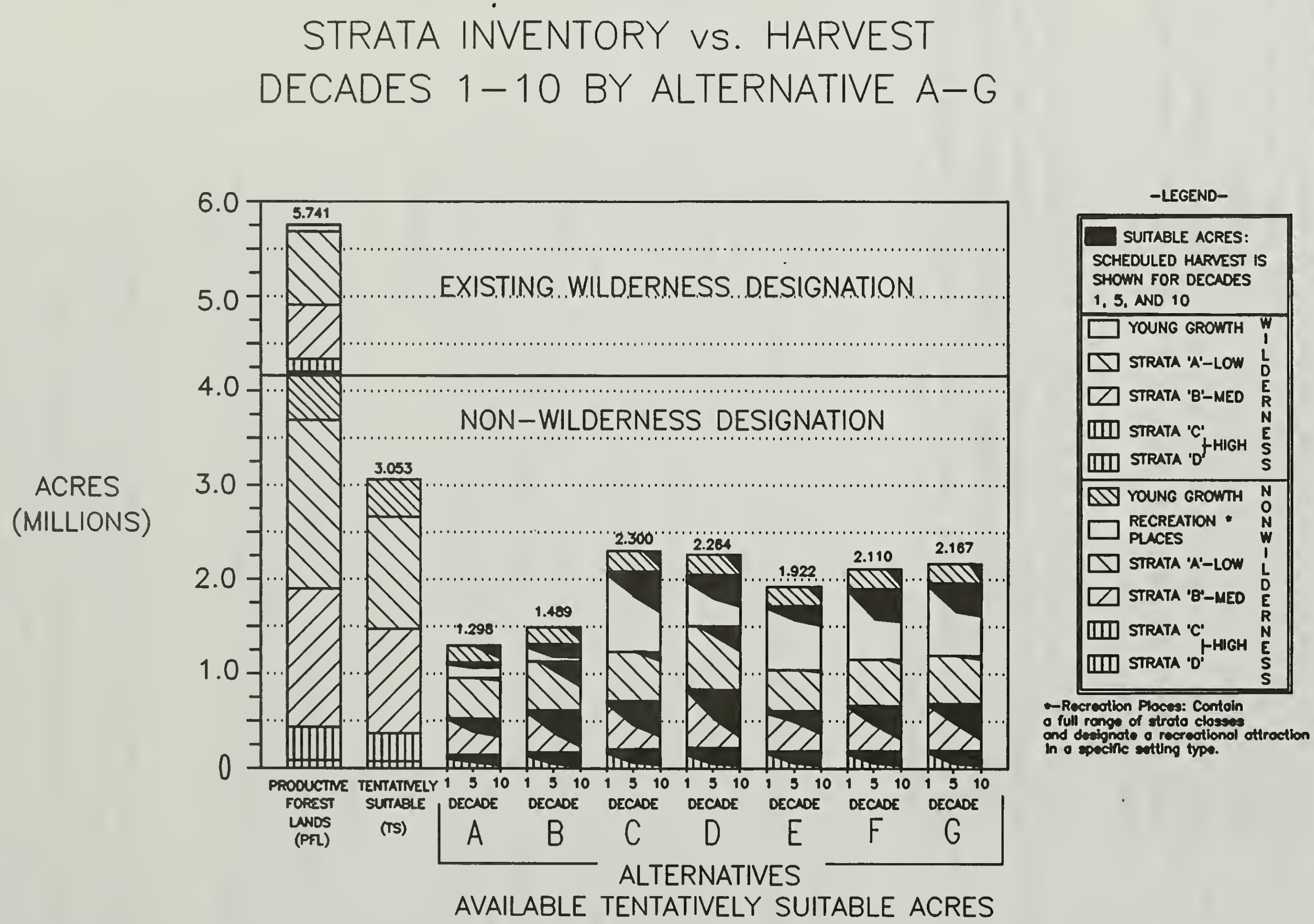
The following cumulative effects analysis considers total Forest-wide acres managed for timber production. Figure 3-50, Strata Inventory vs. Harvest, displays the total acres of productive forest lands (greater than 8 Mbf per acre), tentatively suitable lands (acres that can be considered for timber harvest activities), available lands (portion of tentatively suitable each Alternative analyzed for timber harvest), and suitable lands (those acres scheduled to be harvested and the basis of the Alternative's allowable sale quantity). In Figure 3-50, suitable acres by alternative are displayed in scheduled harvest acres by strata classes. The black portion found within each strata class is the amount of suitable land area

which has the potential to be harvested through the next 100 years, if harvest is maintained at the level anticipated to meet each Alternative's ASQ. The remaining portion of each strata (that which is not black) is the unharvested inventory at the end of the 100 year term. In all alternatives, second growth stands enter into the harvest scenario between the fifth and seventh decades. Second growth is a result of past harvest activities between the period 1909 and present. The majority of the harvest has taken place between 1952 and present which represents the period of time the long-term timber sale contracts have been in operation.

For the 100 year period displayed (decades 1-10), harvest in all Alternatives concentrates in the higher volume strata due primarily to economic considerations (Figure 3-50). The FORPLAN analysis constrained harvest by strata class to fifty percent of the volume being derived from the high volume strata C and D in the first period.

FIGURE 3-50

Figure 3-50



SOURCE: REVISION DATABASE, 2/90 (Q111D, Q111E, AND Q255)
FORPLAN ANALYSIS–ALTERNATIVES A–G, 3/90

Of importance to note is the amount of harvest in each of the strata classes and the amount of remaining acres on a forest-wide basis rather than just the Alternative. Forest-wide, acres remaining include existing wilderness designations, Monuments, unsuitable forested lands, and management area prescriptions limiting or not allowing timber harvest activities to occur.

Using 1989 as a base year for existing strata classes, forest-wide, the high volume strata classes remaining at the end of 100 years range from 45 (Alternative C) to 74 (Alternative A) percent. The medium volume strata remaining at the end of 100 years range from 66 (Alternative D) to 90 (Alternative A) percent. Acres associated with the low volume strata remaining at the end of 100 years range from 87 (Alternative B) to 99 (Alternative A) percent. Young-growth timber stands, although not being ready for harvest until late in the 100 year period range from 67 (Alternative C and D) to 78 (Alternative A) percent. The second growth stands play a significant role in providing timber for harvest late in the periods displayed.

If harvest was constrained to occur proportional to the existing strata, all Alternatives would need larger suitable land bases in order to meet the same allowable sale quantity. This would result from more harvest in the low and medium strata classes with less harvest in the higher strata. More acres of the lower volume strata would be needed to meet the same volume outputs derived from the higher strata classes.

In general, alternatives which prescribe the most acres to development-oriented land allocations will gradually have stands in younger timber age classes, fewer stands of old-growth, and a younger average age of timber stands Forest-wide. The current Tongass Land Management Plan scheduled 17,276 acres for harvest each year. The average annual acres actually harvested between fiscal year 1980-1989 was 8,085 acres, less than one half the scheduled acres. The old-growth forest was reduced by a total of about 1.5 percent during the last 10 years.

For all of the alternatives, standing volume will decline over a period of decades until a point of equilibrium is reached where harvest equals growth. On lands where timber management prescriptions have been implemented, per-acre growth rates will be greater at the end of the planning period than at the beginning because regenerated managed stands will grow at a faster rate than existing unmanaged stands.

As more stands are harvested and managed for timber production, there will be a gradual decrease in the population of the more shade tolerant western hemlock. Sitka spruce is favored in planting and as crop trees during precommercial thinning. Over time, fluting in hemlock, mistletoe infestation, and other natural damaging agents will decrease in stands managed for timber production

as more vigorous second-growth stands develop. There will be less breakage and logging defect in second-growth stands than in existing overmature old-growth stands. Second-growth stands will be more economic to harvest because of higher volume per acre, existing road networks, and the ability to use more efficient logging equipment on the smaller timber.

The per-acre yield of commercial products from the Forest would increase as stands are managed to maintain fast growth rates by controlling competing vegetation. Growth will also be enhanced through precommercial thinning. All alternatives meet or exceed the requirement that growth rate by the year 2040 be 90 percent of the long-term sustained yield.

In the first decade of the planning horizon, the average annual allowable sale quantiy in Alternatives B, C, D, E1, F, F1, G and G1 exceeds the 1980-1988 average harvest. Alternative E provides 280 MMBF which is slightly under the 1980-1988 average of 295 MMBF.

Using 1989 as a base year, Alternatives C, D, E1, F, F1, G, and G1 harvest levels in the first decade would meet the experienced harvest level of 377 MMBF net sawlog from the Tongass.

In the second decade of the planning horizon, harvest levels in Alternatives B, C, D, E1, F, F1, G, and G1 exceed the 1980-1988 average harvest similar to the first decade. However, if the 1989 harvest level of 377 MMBF net sawlog is used as a base year, only Alternatives C and D have the potential of meeting that level of demand.

Considering historical harvest between the period 1952 and 1989, the Tongass has supplied 306 MMBF net sawlog. All Alternatives have the potential to supply this amount for the next ten decades with the exception of Alternatives A and E.

The existing timber mills in Southeast Alaska are expected to face fluctuating supplies over the next twenty years. Projections indicate that the supply of timber from the private sector will decline dramatically in the first and second decades of the planning horizon. Total supply from the private sector is predicted to drop sharply due to Native timber lands supply being depleted. Alternative D which has an ASQ of 550 would potentially offset this fall in timber supply. Alternatives C, E1, F1 and G1 would maintain the (1989) experienced harvest level from the Tongass but not make up the shortfall expected from private lands. The remaining Alternatives would not meet the 1989 harvest level nor provide for future predicted reductions on private lands.

Alternatives A and E would not provide adequate supply within contract boundaries to maintain current contractual obligations for either the APC (Alaska

Pulp Corporation) or the KPC (Ketchikan Pulp Company) long-term contracts. Short-term timber sales could be maintained at 1980-1988 harvest levels for all Alternatives. Increases over the 1980-1988 level could not be maintained by Alternative B.

Alternatives that do not supply sufficient volume to maintain the long-term contracts, have the potential of impacting the short-term (independent) timber sale program. Impacts would result from adjustments that would likely occur in the existing mill infrastructure.

If demand returns to the level experienced in the 1970's, then supply would become the primary factor limiting the vigor of the timber industry in Southeast Alaska's market area. Since the supply shortfall from private lands will likely occur later in the first decade and into the second decade of the planning horizon. Alternatives which provide higher ASQ's during these periods would be most beneficial to the timber industry. Alternatives C and D do this the best with Alternative D being able to offset some of the loss in timber harvest from Native lands in the first decade.

MITIGATION

A range of activities can be used to avoid, minimize, or compensate for impacts to timber quantity and quality. The types of mitigation measures will not vary by alternative, but the degree to which they are applied will depend on the rate and location of timber harvest activities.

The effects of other resource activities on timber, especially on the allowable sale quantity, can often be mitigated through intensity of timber management activities on lands scheduled for harvest. The degree to which these mitigative measures are applied is closely related to the amount and location of land available to be considered for timber management activities. Effects of other resource activities within limited acres available for timber harvest consideration have the potential of lowering the selected Alternatives ASQ, thus directly impacting the established timber industry.

Reductions in demand and yield can be mitigated in three ways: costs, returns on investments and yields from second growth stands. Each of the three categories have limited short-term effects but have the potential of playing significant roles in timber supply in the future.

Costs. Timber categorized in the operability classes of "difficult" and "isolated" normally contain excessive costs associated with roading and logging systems. Total acreage within the tentatively suitable land base associated with these two operability classes is about 890,000 acres. During market periods when low returns are generated from timber products from the Tongass, these stands of timber should be minimally entered into the timber sale offer program. During periods of high returns, such as being experienced in today's markets, the

difficult and to a much lesser extent isolated stands could play a more significant role in timber supply. By entering into these lands during optimum time periods, additional harvest volumes can be acquired to offset shortcomings during low markets.

Returns on Investments. Timber yields from the Tongass are expected to increase substantially from the conversion of old-growth to second-growth. These areas previously harvested have roads in place and many have been precommercially thinned. The investments in these lands need to be protected so that yields associated with the harvest of remaining old-growth as well as second growth stands can be recaptured in later entries. Loss of these areas to land designations precluding timber harvest will have the potential of significantly impacting predicted timber supply in the future decades.

Yields. Higher yields may also come from new technology, allowing commercial thinning in stand types typical to Southeast Alaska. Effectiveness will result if thinning operations can be achieved over long yarding distances with minimal damage to residual timber.

Fertilization of regenerated stands has been tested in some locations of the Tongass (i.e., Thomas Bay, Stikine Area). Fertilization of stands on some soil types has increased per acre yield and shows promise with the exception of costs associated with application and maintenance. Application of this method of increasing timber yields will be dependant on the effects on other resources, costs of application, and returns in timber volume as a result of use.

Research is needed that would allow uneven-aged management of timber stands on a broad scale while maintaining the health and vigor of residual timber. Today's harvest systems are ineffective on large land areas with steep topography, due to damage to residual timber stands, cost of operations, and ineffectiveness of system types on large timber.

TRANSPORTATION

AFFECTED ENVIRONMENT

The transportation system in Southeast Alaska uses many different modes of travel; air, water, roads, and trails. Historically, marine transportation has been the major method of moving freight and passengers, however, during the last three decades air services have developed to serve the growing demand for rapid transportation between communities within Alaska and to the contiguous United States. On National Forest land, road and water transportation facilities initially have been developed to support timber harvest activities.

Air and Marine Transportation System

Air traffic demands in Southeast Alaska are met by commercial airlines, air taxis, and helicopters. The major Southeast Alaska communities, are served by at least two daily passenger jet flights. Scheduled sea/land air taxi operations provide service carrying passengers, small freight and mail to outlying communities. Helicopters are used extensively to transport people and cargo to remote inland locations.

Marine traffic corridors are well defined in Southeast Alaska. The Alaska Marine Highway Ferry System provides transportation of passengers, freight and vehicles throughout Southeast Alaska, with connections to British Columbia and Washington State. Several cruiseship lines provide transportation for tourists during the summer season. Tug and barge lines provide general cargo, heavy freight, and log towing services. Ocean freighters provide shipping from Southeast Alaska ports for products from both the National Forest and private lands. The waterways are also extensively used by boaters, hunters, fisherman, divers, and others.

Access to Continental Road Systems, Internal Ties, Utility Corridors

Access to the continental road system is currently provided at only five points in Southeast Alaska by the Alaska Marine Highway (all are water ports). Four of these connections are to the United States communities of Haines, Hyder and Skagway, Alaska, and Bellingham, Washington, while the other is to the Canadian community of Prince Rupert, British Columbia. A private ferry provides service between Vancouver, British Columbia and Haines, Alaska during the summer.

Several opportunities exist for State Highways to the continental road system. See "Analysis of the Management Situation", Tongass National Forest, January 1990, Chapter 3 Lands. The route receiving the most attention during 1989

was the Bradfield Canal/Craig River corridor. A powerline from Tyee hydropower site along this same route to Canada has been proposed which could provide access to the ocean from Canada. It would be possible to connect Wrangell and Ketchikan to the continental road system by roads and ferries.

The State of Alaska's Southeast Alaska Transportation Plan (ADOTPF 1986), has identified three potential internal corridors: Sitka to Baranof or Rodman Bay, Kake to Petersburg, and upgrading the Prince of Wales road system from Control Lake to Red Bay. Prince of Wales Island has the only road system that interconnects island communities in Southeast Alaska.

Forest and State Highways

When a Forest development road provides a connection between communities, serves local needs such as mail delivery, or connects public roads within the National Forest, it can be designated as a Forest Highway. Usually, Forest Highways are upgraded to State Highway standards, and jurisdiction is turned over to the State. To date, the Alaska Department of Transportation and Public Facilities, the Federal Highway Administration, and the Forest Service have agreed to designate a potential 362 miles as Forest Highways. So far, the State has been given the jurisdiction and maintenance responsibility on 181 of these miles. Since the Forest Service does not have the authority to provide public services, such as, snow removal, the State's assumption of jurisdiction and maintenance responsibility usually benefit the surrounding communities. Including some Forest highway mileage, there are about 500 miles of State Highway in Southeast Alaska (ADOTPF 12/85).

Forest Development Roads

Forest development roads are constructed to provide access to National Forest lands and are functionally classified as arterial, collector, and local roads.

Arterial roads serve large land areas and usually connect to public highways.

Collectors serve smaller land areas and are usually connected to Forest arterial roads or public highways. These roads collect traffic from Forest local roads.

Local roads serve as terminal roads or connect terminal facilities with Forest collector, arterial, or public highways.

All classes of roads are built to standards appropriate to their planned uses, considering safety, cost of transportation, and impacts on lands and resources. All forest development roads, except for those in a few administrative sites and campgrounds, are single lane with native rock surface, designed for off-highway loads. Typical local roads are 14 feet wide, have a pit run rock surface, and a

safe travel speed of ten miles per hour (mph). High standard arterial roads are normally 16 feet wide, may have a crushed rock surface, and are designed for a safe travel speed of up to thirty mph. Travel speed on lower standard roads is often controlled more by surface roughness than by alignment or grade.

Construction takes place on terrain that is almost completely composed of soils that will not support heavy equipment. The method of construction is to overlay the soft native material with quarry rock, which is end-dumped from a stable rock embankment to a depth necessary to support the hauling vehicles. The minimum depth of quarry rock required is about thirty inches.

The Alaska Regional Guide, which incorporated the Southeast Area Guide, and the Tongass Land Management Plan, provide standards and guidelines pertaining to transportation system development and planning. Best management practices (BMP's) (Appendix I) provided through the Soil and Water Conservation Handbook are also used to ensure minimal effects from road construction and maintenance on other resources.

The Forest Development Road System includes 2,640 miles of road which provides access to about seven per cent of the Tongass National Forest. About 852 miles of Forest development road are not managed for cars and truck use, but foot traffic and bicycles are encouraged. Off-highway vehicles (OHV), such as trailbikes, and snowmobiles are permitted on many of these roads; although they are prohibited on certain roads, for economic, wildlife, recreation or safety reasons. Of the 1,790 miles of road open to public motorized vehicle use, 1,115 miles are connected to communities. The remainder are isolated island road systems that require chartered barge or ferry access. (See Tables 3-117 and 3-118, and the map of existing roads in the map packet.)

TABLE 3-117
EXISTING FOREST DEVELOPMENT ROAD SYSTEM

Class	*FDR Miles*[1]	*Percent of Total*
Arterial	372	14
Collector	1,047	40
Local	1,223	46
Total	2,642	100

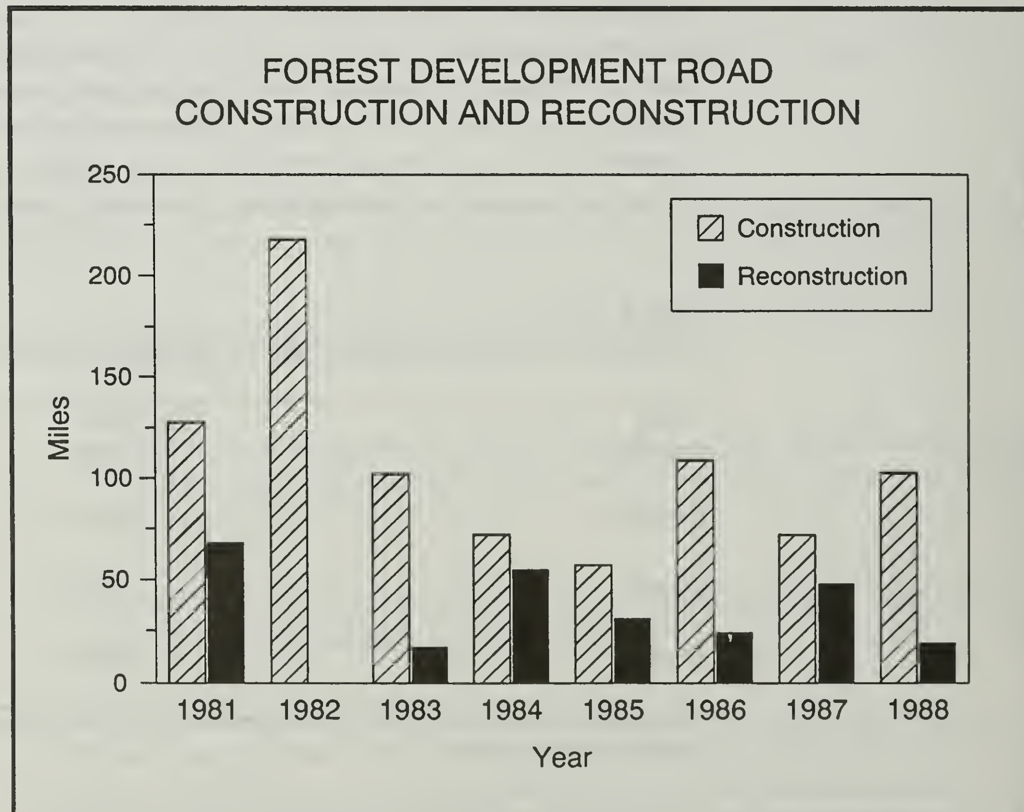
[1]Existing miles from Transportation Inventory System 7/89. This does not include approximately 500 miles of short-term roads.

TABLE 3-118
EXISTING FOREST DEVELOPMENT ROAD STATUS

Description	*FDR Miles**	*Percent of Total*
Roads not available for car and truck use	852	32
Open, but not accessible	675	26
Open, connected to communities	1,115	42
Totals	*2,642*	*100%*

Figure 3-51 displays miles of road construction and reconstruction in the Tongass National Forest between 1981 and 1988.

FIGURE 3-51



Cost Share

Whenever possible, duplication of road systems or facilities is avoided by attempts to negotiate agreements with other landowners to share in the costs or construction and/or maintenance of particular road systems. Five share cost agreements have been entered into with other separate landowners: Sealaska Corporation, Huna Totem Corporation, Goldbelt Corporation, Cape Fox Corporation, and Yak-Tat Kwaan Corporation, to develop road networks to satisfy joint transportation needs. Cost share agreements have been entered into for the following log transfer facilities: Hobart Bay (Goldbelt Corporation); Long Island (Huna Totem and Sealaska Corporations); and Broken Oar (Yak-Tat Kwaan).

Log Transfer Facilities

The transportation of harvested timber in Southeast Alaska requires transport of harvested logs from isolated islands via land and water routes to processing plants. This normally requires harvested log bundles be removed from log trucks and placed in salt water where the log bundles are then towed to pulp or sawmills. Log transfer facilities are needed to transfer logs to and from the water and to construct "log booms" to contain the log bundles for towing. There are a total of 116 log transfer facility sites existing in Southeast Alaska on National Forest lands and an additional 17 sites which the USDA Forest Service uses or is seeking agreements to use on State or private lands. In addition to the log transfer facility guidelines in the Regional Guide, the USDA Forest Service has adopted the "Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines" developed by the Alaska Timber Task Force. The Environmental Protection Agency has adopted these guidelines as standard conditions for permits issued under provisions of the Clean Water Act.

TRANSPORTATION

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

This section estimates the effects of each alternative on the transportation system of Southeast Alaska and log transfer facilities on the upland and benthic environment. The environmental consequences of road construction are discussed in sections of this document relating to the specific resource.

Transportation Systems. The air and marine transportation systems are primarily affected by the number of people who live in Southeast Alaska. Assuming that the greater the employment, the greater the population and therefore the greater the need for air and marine transportation, Table 3-119 might indicate a difference in the need for air and marine transportation under each alternative.

TABLE 3-119
ESTIMATED RELATIVE DIFFERENCE IN TOTAL EMPLOYMENT POTENTIAL BY ALTERNATIVE
Relative Change from the current alternative

Alternative	*A*	*B*	*C*	*D*	*E*	*E1*	*F*	*F1*	*G*	*G1*
	-15%	-7%	0%	+7%	-12%	-5%	-3%	-2%	-2%	-1%

Forest development roads may provide opportunities for connection of remote communities to each other, or the Alaska Marine Highway. Each alternative would build or extend isolated road systems and extend road systems connected to communities. This situation might change the kind of service provided by the Alaska Marine Highway from long distance mainline service to shuttle service between island and mainland road systems or communities. If Forest development roads become major high use connections between communities, the Alaska Marine Highway, or serve local needs, they may be considered for conversion to Forest Highway. Usually these roads are arterials and collectors. Alternative D builds the most arterial and collector roads and Alternative A builds the least. Table 3-120 displays the total new arterial and collector, and local road development after five decades for each alternative.

TABLE 3-120
MILES OF NEW ROAD DEVELOPMENT AT THE END OF THE FIFTH DECADE[1]

	Alternative									
Class	*A*	*B*	*C*	*D*	*E*	*E1*	*F*	*F1*	*G*	*G1*
Arterial/ Collector	1,040	2,860	3,145	3,705	1,690	2,620	2,710	2,870	2,705	2,915
Local	1,040	2,860	3,145	3,705	1,690	2,620	2,710	2,870	2,705	2,915
Total	2,080	5,720	6,290	7,410	3,380	5,240	5,420	5,740	5,410	5,830

[1]This does not include approximately twenty percent additional short-term roads that will be needed for each alternative.

Access and Utility Corridors. The land use prescriptions proposed in this document are classified as either "windows", where corridors do not conflict with the proposed management objective, or "avoidance areas", where corridors do conflict. The Alaska National Interest Lands Conservation Act, Title XI expands authorities to permit the construction of transportation or utility corridors through areas designated by legislation, such as Wilderness or National Monuments. The effects of the alternatives on transportation and utility corridors are described in the Lands section of this chapter. A list of potential corridors may be found in Chapter 3, "Lands," Analysis of the Management Situation, Tongass National Forest, January 1990.

Forest Development Roads. Table 3-121 displays the cumulative miles of Forest development road which are estimated to be needed for each alternative at the end of each decade listed.

TABLE 3-121
CUMULATIVE ROAD MILES[1]

	Alternative						
Decade	*A*	*B*	*C*	*D*	*E*	*F*	*G*
1st	3,440	4,871	4,981	5,567	3,390	4,695	4,704
2nd	4,218	7,028	7,235	8,392	5,190	6,711	6,712
5th	4,729	8,444	8,712	10,081	6,020	8,053	8,039
10th	5,069	9,702	9,805	11,720	6,541	9,023	9,016

[1]Includes 2,642 miles of existing road as of 7/89 - from Transportation Inventory System. This does not include approximately twenty percent additional short term roads that exist now or are needed for each alternative.

Alternative D would construct the most miles of road, 120 percent of Alternative C, and Alternative A would construct the least miles of road, 52 percent of alternative C.

Table 3-122 displays the average yearly road construction for each alternative. Totals are shown for each administrative Area of the Tongass National Forest.

TABLE 3-122
AVERAGE NEW ROAD CONSTRUCTION PER YEAR
(miles/year)

					Alternative			
Decade	*Area*	*A*	*B*	*C*	*D*	*E*	*F*	*G*
1st	Chatham	3	57	49	50	5	50	51
	Ketchikan	48	130	116	132	80	105	105
	Stikine	29	36	69	111	44	50	50
Total		**80**	**223**	**234**	**293**	**129**	**205**	**206**
2nd	Chatham	3	55	46	46	5	47	48
	Ketchikan	47	126	111	131	76	102	102
	Stikine	28	36	68	45	50	51	
				105				
Total		**78**	**217**	**225**	**282**	**126**	**202**	**201**
1st - 5th	Chatham	2	29	24	24	3	25	25
	Ketchikan	25	68	62	71	42	56	56
	Stikine	15	14	35	54	23	27	27
Total		**42**	**111**	**121**	**148**	**68**	**108**	**108**
6th - 10th	Chatham	1	37	27	29	2	29	30
	Ketchikan	22	75	47	63	34	48	48
	Stikine	11	14	35	72	16	20	20
Total		**34**	**126**	**109**	**164**	**52**	**97**	**98**
1st - 10th	Chatham	1	18	15	15	2	15	16
	Ketchikan	14	42	36	42	24	34	33
	Stikine	9	11	21	34	13	15	15
Total		**24**	**71**	**72**	**91**	**39**	**64**	**64**

This table shows that the Ketchikan Area would likely have the most road construction activity and the Chatham Area the least in all alternatives. Of the new road construction about 50 percent are arterials and collectors, and 50 percent local roads. Over 60 percent of the roads used for each alternative over the planning horizon would be constructed in the first two decades. Since little or no second-growth timber will be ready for harvesting until well into the future (60 or more years) and the Tongass is 93 percent roadless, any timber

harvesting in the first few decades will require a substantial amount of road construction to provide access.

Currently, about one-third of the existing road system are not managed for continuous car and truck use, but may allow non-motorized and foot traffic. Bridges may be removed from these roads, and the roads themselves may revegetate naturally. Another one-third are currently open to motorized vehicles, but isolated from large road systems or communities; the case on remote islands. The remainder of the existing roads are open to motorized vehicles and connected to communities, and are maintained for continued multiple-use activities. As projects are proposed, cumulative effects of the current road system and proposed new road systems will be considered in a site-specific manner for the resources present. These project level decisions may change the mix of open road density for any given watershed or transportation network depending on the the specific resources that may need consideration.

Each alternative will require reconstruction of a portion of the existing road system in each decade. Reconstruction of a road protects the original investment, protects environmental resources, and makes the road suitable and safe for the intended use. Reconstruction involves the rehabilitation of the original roadbed. Common reconstruction activities include cleaning ditches and culverts, replacing damaged drainage structures, re-installing modular bridges, and grading and shaping of the road surface.

Off-highway Travel. Because of low population and expanses of unroaded and relatively inaccessible areas, the situation in Alaska is different from that found in the lower 48 States. Steep densely vegetated terrain limits the use of typical off-highway vehicles (OHV's) such as three-wheelers and all-terrain vehicles (ATV's) to beaches, communities, road systems, braided river channels and frozen or snow covered areas. Trails in Southeast Alaska do not lend themselves well to the use of OHV's because of wet ground conditions which often necessitate the use of boardwalks.

Except in a few specific areas, the Tongass has not experienced resource damage typically associated with OHV's that have been experienced elsewhere. Because of this, the Forest travel plan closes only specific areas to OHV's, with the rest of the Forest remaining open for OHV use.

In practice, Federal Regulations prohibit the use of vehicles off roads "in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources" (36 CFR 216.13). Muskegs are extremely susceptible to damage from OHV's when not adequately covered with snow, and should not be otherwise operated on. Actively enforcing this prohibition would require a closure order issued in accordance with 36 CFR 261 Subpart B. At present, no sweeping closures of muskeg areas have been issued, but even with such closures,

enforcement would be difficult. An educated and responsible public is needed for the protection of this resource. As the road system expands, more muskeg is available to OHV's and some damage may occur. To date, the incidents have been isolated and minor, but damage, once it occurs, is long lasting. Road closures to keep OHV's out of specific areas is also an effective tool to mitigate potential OHV impacts.

Transportation System & Travel Planning. Transportation and travel planning begins with an identification of overall travel corridors, community needs and desires, places of interest, places where changes in the kind and ease of access are identified and permitted by the forest plan. Local desires for infrastructure expressed through state and local government planning efforts are carefully considered, and factored into alternatives. Forest Service cooperation with state and local government to meet local desires can be seen in the highway system on Prince of Wales Island.

Long range and short range transportation planning has been accomplished. Long range planning involves identification of routes and methods of access to the national forest, often involving the mixed modes of air, water and surface transportation. These routes, and key access locations are mapped at a scale of 1:2,000,000 on the Transportation Edition of the Regional Base Map, 1984. Arterial connections for transportation through out Southeast Alaska has been coordinated through an interagency group involved with utility and transportation corridors.

These routes and others are shown on a series of base maps at a scale of 1"=1 mile. Copies of the maps are available at Forest Supervisor's Offices and Ranger District Offices. The characteristics of each road are stored in a data management inventory system Both maps and inventory are required by FSM 7710 and are updated to maintain a current record. It is expected that every transportation facility will have a clear objective. Road management objectives are a requirement for all roads on the permanent transportation system. Most routes are also identified and maintained in a geographic information system (GIS) maintained at each Forest Supervisor's Office. The 1986 Amendment to the Tongass Forest Plan included a map of the transportation plan for the forest. The existing transportation system is displayed on the back of the "No Change" Alternative map in the map packet.

Access and travel plans are based on the concept that access is a resource to the people who want to enjoy and use the National Forest and it's resources. The access to the forest can be by cross country travel, but travel is facilitated by constructed facilities for foot or vehicle travel. In most places, travel through the national forest is free from any restrictions. Where restrictions are in place, they usually relate to the type of access permitted. An example of restriction in type of access is the limit on use of motor vehicles in designated Wilderness.

Access and travel planning includes developing limits for the type of access (pedestrian vs vehicle) or determining the kind of motorized vehicle use (passenger vehicle vs high clearance vehicle) to be encouraged in the process of managing access as a resource to people. The wide range of existing and potential uses combined with the range of people perspectives and values make the combinations of transportation and travel planning varied and challenging. The road management objectives for roads on the permanent transportation system document the mix of uses intended (FSH 7709.55 R-10 supplement).

Travel planning has not been systematically pursued by that name for the transportation system on the Tongass National Forest. Under a number of other names, the objectives of identification and satisfaction of a variety of access related issues have progressed in a number of forums.

Additional details of transportation opportunities are developed and included in alternatives as a part of the project planning and NEPA disclosure processes. Planning for the north end of Prince of Wales in the 1989-94 KPC Long-term Timber Sale Contract included access management strategies. Travel planning was included for this 870,000 acre portion of the Ketchikan Area of the Tongass National Forest, and in the recent Supplemental EIS on the Stikine and Chatham Areas.

The implementation of this revision is expected to occur in an atmosphere of greater competition between resources and interest groups for access to the Tongass National Forest and its resources. With the increased competition, greater systematic site-specific planning for travel will be needed over the planning horizon.

Log Transfer Facilities. Table 3-123 displays the number of new log transfer facilities estimated to be needed for each alternative. These facilities would be constructed over a 30-year period.

TABLE 3-123
NEW LOG TRANSFER FACILITIES

				Alternative			
Area	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Chatham	4	25	30	36	7	29	30
Ketchikan	53	66	85	87	57	76	76
Stikine	16	27	30	30	16	30	30
Total	**73**	**118**	**145**	**153**	**80**	**135**	**136**

Log transfer facilities will impact the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: structural embankment (placing rock in the water) and bark deposition (bark that accumulates underwater). Structural embankment is estimated to cover approximately one-quarter acre per site.

Log transfer facilities are estimated to impact approximately 1.96 acres of marine benthic habitat for the average site (Faris and Vaughan 1985). Bark and debris accumulation may decrease over time due to water currents, but no estimate on the length of time before a bark accumulation is completely eliminated is known.

Faris and Vaughan (1985) examined the extent of total damage to marine benthic habitat in Southeast Alaska. Their results indicate that from the 90 sites permitted at the time, a total of 176 acres would be impacted (using the 1.96 acre average). This is 0.02 percent of the total estuarine area that is less than 60 feet deep. Moreover, when they examined all of the potential area of bark and debris accumulation from all permitted and proposed sites in Southeast Alaska, they found that a total of 317 acres would be impacted. This is 0.09 percent of the total estuarine area that is less than 60 feet deep in all of Southeast Alaska. This result corresponds with the conclusion of Sedell and Duval (1985) that the evidence of damage on important marine populations (bivalves, crabs and salmonoids) was inconclusive because of the small area impacted due to log transfer facilities. This evidence resulted in development of the current siting guidelines, which include avoiding crab habitat and shallow areas at the head of bays, to ensure that impacts are minimized.

The largest effect of bark and debris accumulation is that little neck clams and bay mussels which have been shown to be eliminated when 4 to 5 inches of bark accumulates (Freese and O'Clair 1987). Further, Conlan and Ellis (1979) report that mollusks and several polychaetes (marine worms) were excluded

by bark debris greater than 1 inch in thickness and effects of bark may last several decades. From this evidence, it can be assumed that other plants and animals that live in and on the bottom (the marine benthic habitat) would also be affected.

Toxic substances, occurring as leachates from bark, precipitate in saltwater, therefore, leachates do not appear to be a major problem in open water or where good water circulation exists (Sedell and Duval 1985).

The other potential effects associated with log transfer facilities are from log rafts and log storage in saltwater. The area under a log raft may be affected by bark accumulations with effects similar to, but not as concentrated as, those discussed for LTF's. In addition, if the raft is stored in a bay or cove for a long period of time, marine algae may be affected by shading. Occasionally, rafts stored in shallow depths may ground on the bottom. This would cause mechanical disruption or compaction of inter-tidal and sub-tidal bottom habitats. The effects would not last long, because plants and animals would begin to return shortly after the raft re-floated, unless the site was repeatedly used and log rafts frequently grounded. Current guidelines call for raft storage in areas where they will not ground.

Table 3-124 displays the total estimated acres of marine benthic habitat that would be impacted from log transfer facilities for each alternative for the next 30 years using 1.96 acres each.

TABLE 3-124
LOG TRANSFER FACILITY MARINE BENTHIC DISTURBANCE
In Acres

	Alternative						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Existing	227	227	227	227	227	227	227
New	143	231	284	300	157	265	267
Total	**361**	**458**	**511**	**527**	**384**	**492**	**494**

Table 3-125 displays the amount of upland area that might be disturbed due to log transfer facilities over the next 30 years. The effects of log transfer facilities on upland areas is similar to the effects produced by road construction.

TABLE 3-125
LOG TRANSFER FACILITY MARINE UPLAND DISTURBANCE[1]
In Acres

	Alternative						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Existing	928	928	928	928	928	928	928
New	1,144	1,848	2,272	2,400	1,256	2,120	2,136
Total	**2,072**	**2,776**	**3,200**	**3,328**	**2,184**	**3,048**	**3,064**

[1]Based on approximately eight acres of upland area for each log transfer site, including small sort yards and small camp. (Prince of Wales Island Area Plan, Alaska Department of Natural Resources, December 1988, page 16 Chapter 2, Management Guideline B. Five acres for log transfer facility and three acres for possible logging camp.)

MITIGATION

Standards and guidelines (Appendix G), and Best Management Practices (BMP's) (Appendix I) provide the direction for the planning, location, design, construction, and maintenance of the Forest Development Road System.

The standards and guidelines ensure a safe and environmentally sound road management strategy providing for the consideration and protection, where appropriate, of other resources including but not limited to scenic quality, wildlife, soil, water quality, wetlands, estuaries, and fish.

VISUAL QUALITY

AFFECTED ENVIRONMENT

The Tongass National Forest offers a variety of scenery to its visitors, from spectacular mountain ranges and the glaciers of the mainland to areas managed for timber harvest and a range of recreational opportunities. The scenic qualities of Southeast Alaska are evident wherever one travels in the Tongass.

The Forest is most often viewed from the communities of Southeast Alaska, from the Alaska Marine Highway ferry route, from cruiseship routes, and from popular small boat routes and anchorages. Existing road systems and recreation trails also provide access to many areas. Tourist-related "flightseeing" via small aircraft is on the increase and provides aerial views of the forest landscape.

Visual Character of the Forest

The Tongass National Forest is made up of six distinct landscape character types (*Visual Character Types*, 1979). Each type has unique visual characteristics of landform, rock formations, waterforms and vegetative patterns.

In the **Admiralty/Chichagof** visual character type, landforms are generally rounded, with exceptions where mountainous terrain is rugged and snow covered most of the year. Rocky islands, reefs and rock bluffs are found frequently on the outer coast of Chichagof Island, the Mitchell Bay and Kootznahoo area and along the southern tip of Admiralty Island. Saltwater bays and estuaries are numerous. Much of this character type exists in a natural-appearing condition. Small communities such as Hoonah, Tenakee Springs, Pelican, Elfin Cove and Angoon are located within this character type. The West Chichigof-Yakobi Wilderness and the Admiralty National Monument are located here as well. Timber harvest activities are presently occurring on Chichagof Island from Icy Strait to Peril Strait on both private and National Forest lands. Mining operations are occurring on public lands on Admiralty Island.

The **Kupreanof Lowland** visual character type encompasses the central portion of the Inside Passage. The area is made up of islands with rolling terrain and topographical relief varying from 300 to 1,500 feet, and is separated by an intricate network of waterways. Mountains are scattered and block-like, rising to 3,500 feet above the lowlands. The shoreline is made up of many small bays, rock reefs, and occasional small gravel beaches. The spruce/hemlock forest dominates this character type, with exceptions in areas of higher elevations where alpine ecosystems dominate.

The communities of Kake, Rowan Bay, Port Protection, Point Baker as well as the Tebenkof Bay and Petersburg-Duncan Salt Chuck Wildernesses are within this character type. The southern portions of Kuiu and Kupreanof Islands, Rocky Pass, and south Lindenburg Peninsula are in a natural condition. The northern portions of Prince of Wales and Kuiu Islands are heavily modified due to timber harvest and road development activities.

The **Baranof Highland** character type reflects the unique qualities of Baranof Island, with elevations reaching 3,000 to 5,000 feet. Shoreline forms are very rugged with steep-sided fiord country on both east and west coasts.

The majority of this character type remains in a natural appearing condition. The communities of Sitka, Baranof Warm Springs and Port Alexander are located on Baranof Island as well as the South Baranof Wilderness Area. Timber harvest activities have occurred on the northern reaches of Baranof Island from Sitka Sound to Peril Strait to Chatham Strait as well as Kruzof Island.

The **Cordova-Yakutat** visual character type runs east to west, spanning from Yakutat to the Malaspina Glacier to Icy Bay to Cordova. The Chugach Mountains to the north and the Wrangell-St. Elias Mountain Ranges to the south act as visual backdrops to this character type and includes the second tallest peak in North America. The Yakutat Forelands dominate scenes adjacent to Yakutat and Russell Fiords which include the community of Yakutat.

Past logging activities are evident near Yakutat. Small fish camps are visible along the rivers and beaches. These large expanses of sand beaches stretching for miles make this a unique area on the Tongass. The Russell Fiord Wilderness is in this character type.

The southern reaches of the forest are represented by the **Coastal Hill** visual character type, whose islands offer an extensive landform variety with elevations ranging from 1,000 to 4,500 feet. Areas with elevations less than 3,500 feet were glaciated and have rounded hummocky summits, knobs and ridges.

The communities of Wrangell and Petersburg are within this character type. The area is substantially developed, with timber harvest activities evident on central Prince of Wales Island, north and central Revilla Island, Mitkof, Wrangell, Deer and north Etolin Islands. Ferry line and cruiseship traffic pass through this area.

The **Coast Range** visual character type encompasses the mainland from Dixon Entrance to the south and Lynn Canal to the north. The scale of the landforms are large and massive, generally ranging from 5,000 to 7,000 feet in elevation, with occasional rock formations reaching to 9,000 feet. Geologic features abound in this character type--cliffs, rock escarpments with jagged peaks, and spires at

higher elevations. Glacial streams are generally braided, and originate in British Columbia.

This character type offers numerous opportunities to view spectacular scenery, and includes the Stikine-LeConte, Endicott River, and Tracy Arm-Fords Terror Wilderness Areas; Misty Fiords National Monument; and the communities of Juneau, Skagway, and Haines. The majority of this character type is natural-appearing, however, there is evidence of past and current mining and timber harvest on both private and public lands. Commercial sight-seeing ventures are promoting the scenic attractions found in this area.

Visual Condition of the Forest

The visual condition of the Tongass varies by location and is dependent on a variety of factors. In addition to the variety of natural aspects of the visual resource (geology, vegetation, waterforms, etc.), visible, man-made developments affect the visual condition of some areas.

These developments include roads, rock quarry sites, timber harvest, log transfer facilities, hydroelectric powerline clearings, recreation facilities, fish enhancement projects, mariculture operations, and mining developments. Development activities on National Forest lands are concentrated mostly in areas near the communities of Petersburg, Wrangell, Ketchikan, Hoonah, and Sitka.

Site-specific project planning using the current forest plan for visual resource guidance is difficult at best. Long-term timber sale commitments and the desire for positive timber sale economics have often limited the consideration of visual quality in timber harvest areas.

Management of lands adjacent to the National Forest (State and private lands) has also affected the visual setting of Southeast Alaska. Timber harvest activities on Native Corporation and State lands, and their associated development, are changing the appearance of parts of Southeast Alaska from a predominantly natural-appearing setting to a more developed and altered visual condition.

Table 3-126 illustrates the existing visual condition of the Forest as seen from the Alaska Marine Highway, currently used recreation places, and primary (Sensitivity Level 1 travel routes) and secondary (Sensitivity Level 2) travel routes and use areas. These areas best reflect the variety of concerns in the forest, from the heavily used ferry lane to areas seen by few people but with greater sensitivity.

TABLE 3-126
EXISTING VISUAL CONDITION[1]

Existing Visual Condition Rating	*Type I*	*Type II*	*Type III*	*Type IV*	*Type V*	*Type VI*
Forest-Wide (excluding Wilderness)						
Seen	4,461,777	34,248	109,211	209,387	568,660	46,111
Unseen	4,428,330	3,440	149,064	342,894	36,853	
		20,448				
Alaska Marine Highway Viewshed						
Seen	998,888	8,164	15,109	52,379	195,852	21,996
Unseen	585,621	1,381	1,918	25,231	130,994	8,782
Recreation Places (excluding Wilderness)						
Seen	1,687,014	23,623	53,616	79,222	221,489	17,064
Unseen	862,968	2,299	8,503	31,935	94,634	2,619
Sensitive Travel Routes & Use Areas (excluding Wilderness)						
Seen	2,972,692	12,519	70,185	156,451	299,976	24,026
Unseen	1,515,591	30,988	74,368	221,129	615,490	58,958

[1]**Definitions of the Existing Visual Condition Types are:**
Type I: Areas are untouched by human activities.
Type II: Changes in the landscape are not visually evident.
Type III: Changes in the landscape may be noticed by the casual forest visitor.
Type IV: Changes in the landscape are easily noticed by the casual forest visitor.
Type V: Changes in the landscape are strong and obvious to the casual forest visitor.
Type VI: Changes in the landscape are in glaring contrast to the natural forest appearance.

Visual Management System

The Forest Service has developed the Visual Management System as a framework for inventorying scenic resources and providing measurable standards for their management. The components of this system are sensitivity levels, variety classes, and distance zones.

Sensitivity levels. Sensitivity levels provide a method to measure the importance of viewed landscapes, and reflect concerns of person(s) viewing the landscape. On the Tongass, Sensitivity Level 1 areas are typically high use roads or trails, the Alaska Marine Highway, tour ship routes, highly used marine travel routes, campgrounds, or developed recreation sites visited by persons with a moderate to high degree of concern for scenic quality. Sensitivity Level 2 travel routes or

use areas are those which receive less use, with the viewer having a moderate degree of concern for visual quality. Sensitivity Level 3 areas are not seen from any of the above areas and receive the least use along travel routes or other areas.

The Sensitivity Level mapping was completed in 1980 and approved by the Regional Forester. As a result of project planning and implementation (i.e., new road or recreation site construction) updating has occurred and is reflected in the current inventory used for the Revision.

Variety Classes. The six Visual Character Types on the Tongass provide a frame of reference for the variety class inventory. Each character type has unique features, many of which increase the scenic quality and interest of the area. *Class A* landscapes have outstanding or unusual features of landform, vegetative patterns, waterforms or geologic features. *Class B* landscapes are common throughout the character type with no outstanding features. *Class C* landscapes have minimal variety in form, line, color or texture.

Distance Zones. The third step in the inventory process is the distance zone mapping. Foreground areas are those seen from the viewer to one-quarter mile away. Middleground areas are seen from one-quarter mile to three to five miles. Background areas are those seen from three miles to infinity.

Visual Quality Objectives

These three elements, sensitivity levels, variety classes and distance zones, are then combined to form Visual Quality Objectives (VQO's), which provide measurable standards or objectives for managing the visual resource. They are based on public concern for scenic quality (sensitivity levels), the diversity of natural features in the landscape (variety class), and the distance from which the landscape is seen (distance zones).

The resulting mapped areas, when combined, form any one of four Visual Quality Objectives. *Retention*, *Partial Retention*, *Modification* and *Maximum Modification*. A fifth VQO, *Preservation*, is assigned to Wilderness. Table 3-127 illustrates the current inventory by travel route and use area characteristics, and defines the four VQO's other than Preservation. Figure 3-52 shows an illustration of the four objectives.

VQO's have been integrated into each of the prescriptions, and will be adopted with the implementation of the Forest Plan. The adopted VQO's will provide the project level interdisciplinary team a visual objective to strive for in their on-the-ground planning process.

TABLE 3-127
VISUAL QUALITY OBJECTIVES[1]

Inventory Visual Quality Objectives	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Forest-Wide (excluding Wilderness)				
Seen	1,407,090	2,842,222	1,059,437	25,645
Unseen	600	2,150,690	1,935,466	2,017,846
Alaska Marine Highway Viewshed				
Seen	201,655	828,557	252,622	8,287
Unseen	17,735	77,725	357,312	318,448
Recreation Places (excluding Wilderness)				
Seen	566,021	1,170,627	339,705	6,737
Unseen	0	289,159	332,678	385,721
Sensitive Travel Routes & Use Areas (excluding Wilderness)				
Seen	1,407,090	2,841,002	1,059,438	19,134
Unseen	600	2,150,690	1,935,466	2,024,358

[1]**Definitions of the Visual Quality Objectives are:**

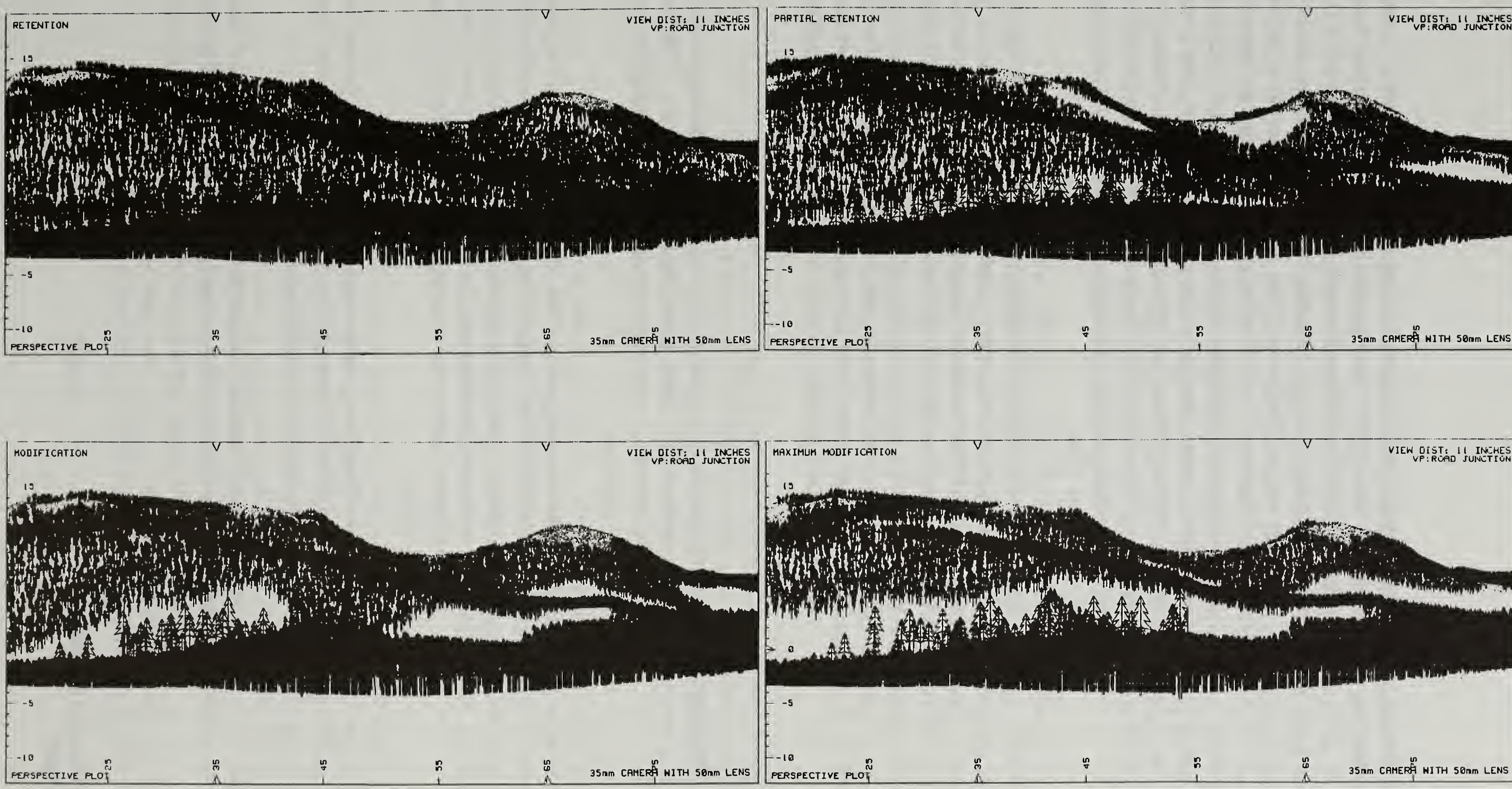
Retention: Landscapes in this setting are visually sensitive to change. Activities are designed to not to visually evident to the casual forest visitor.

Partial Retention: Management activities may be evident, but remain visually subordinate to the characteristic landscape

Modification: This objective provides for management activities which may dominate the characteristic landscape, but borrow from existing form, line, color and texture. The activity appears to be a natural occurrence when viewed as foreground or middleground.

Maximum Modification: Management activities of vegetative and landform alteration may dominate the characteristic landscape. When viewed as background, these activities should appear as natural occurrences within the surrounding area.

FIGURE 3-52
LANDSCAPES AS MANAGED UNDER FOUR VISUAL QUALITY OBJECTIVES



Current Forest Plan Guidance

The Tongass Land Management Plan provides for viewing scenery in its natural condition through the allocation of LUD 1 areas (Wilderness Areas), LUD 2 areas (where timber harvest and most roads are not allowed), and LUD 3 "Special areas" adjacent to many Southeast Alaskan communities (where timber harvest has been reduced because of other resource users.) In other areas designated LUD 3, an extended rotation of 200 years is provided for regenerating timber stands in areas of high visual sensitivity in some cases. LUD 4 recognizes areas of high visual sensitivity with a 120-year rotation, and areas of medium visual sensitivity with five percent retention. Areas of extended rotation were intended to increase the time frame for harvesting in a particular landform. The normal rotation period is 80 to 100 years (Tongass Evaluation Report, Appendix A, November 1984).

The current Forest Plan provides broad direction for each of the 141 management areas it established and, in some cases, describes appropriate Visual Quality Objectives (VQO's) for specific areas within each management area. The 1979 Tongass Land Management Plan was completed prior to completion of the Visual Quality Objectives inventory. So, although VQO's were part of the direction, they were not based on any formal inventory implemented according to Regional or National guidelines. The revised Forest Plan will adopt Visual Quality Objectives through the land allocation process to be implemented through standards and guidelines.

Scenic Potential

Overall, there is great potential for the Tongass National Forest to provide landscapes of high scenic quality. Eighty-eight percent of the Forest is in an unroaded condition; 20 percent of it is viewed from Sensitivity Level 1 travel routes or use areas.

On the basis of total acreage, thirty-three percent of the Tongass land base is designated Wilderness, ensuring preservation of scenic landscapes in these areas. However, much of the wilderness acreage is located away from the readily accessible marine-related areas adjacent to communities, the Alaska Marine Highway, and the more heavily used small boat routes (Revision Database, Q52, 9/15/89).

Of the Sensitivity Level 1 seen areas or viewsheds, 27 percent are within areas considered forest land tentatively suitable for timber harvest. Thirty-five percent of Sensitivity Level 2 is tentatively suitable.

Scenic potential may also include an increased ability to view landscapes which are currently inaccessible. New roads adjoining communities, new trails, and increased cruiseship operations provide greater opportunities to view the Tongass.

Scenic Byway Program

In 1988, the Forest Service initiated a program to designate scenic travel routes providing access within National Forests as Scenic Byways. The scenic byways program identifies and designates the most scenic stretches of these travel routes for visitors to enjoy, emphasizing interpretation of forest activities and partnerships with other organizations. A scenic byway may include recreation, historical, educational, scientific, or cultural features. The intent of a National Forest Scenic Byway is to provide the traveler with spectacular scenery in harmony with Forest management activities. It can reflect a high quality yet "managed" and changing Forest landscape. Through this program, the Forest Service hopes to showcase both the beauty and multiple-use aspects of the 156 National Forests in the United States.

The Alaska Marine Highway provides access to the communities of Southeast Alaska from Bellingham, Washington and Prince Rupert, British Columbia to Ketchikan and through Southeast Alaska to as far north as Skagway and west to Sitka. It is a "highway" in the sense that it is designed to provide an automobile travel link by ferry from the Lower 48 States to and through Alaska. The Marine Highway serves the communities of Southeast Alaska in the same way that land-based roads do elsewhere. The State ferry system is widely used by tour groups and independent travellers to view the unique scenery of Southeast Alaska.

With this in mind, all, or portions of, the Alaska Marine Highway could be nominated as a National Forest Scenic Byway. The nomination process is independent of the Forest Plan Revision; however, the Plan could recommend a nomination. Each Revision alternative could have different effects to the areas seen from the marine highway.

Demand for Scenic Quality

Demand for scenic quality can best be represented by the increase in tourist-related travel to the Tongass, as well as a heightened awareness and sensitivity of Alaskan residents to scenic resource values. From 1979 to 1989, cruiseship visitation increased from 46,000 passengers to over 200,000 passengers and ferry system use increased from about 250,000 passengers to 343,000 passengers.

Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruiseship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The visitor to Southeast Alaska would, therefore, arrive with expectations and an image of the environment and scenery awaiting them. "The current trend in both State and private industry advertisements capitalize on the scenic splendor of the state, particularly Southeast" (Bright, 1985).

One of the most important findings of the *Alaska Public Survey* was "the importance of the Region's natural resource base in providing an attractive

setting in which to live and recreate. For many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource provided."

If current trends continue, demand for viewing scenic landscapes will increase. Lands adjacent to the Alaska Marine Highway, cruiseship routes, small plane/ flightseeing routes, high use recreation areas, and other marine and land based travel routes will be seen by more people, more frequently, and for greater durations.

VISUAL QUALITY

ENVIRONMENTAL CONSEQUENCES

Each of the alternatives, if implemented, would maintain, alter or enhance the landscapes on the Tongass to varying degrees. Visual Quality Objectives (VQO's) and Existing Visual Condition (EVC) types have been used to describe the future visual condition of the Forest which could be expected with the implementation of the seven alternatives. The terms are identical to those used previously in the discussion of the EVC inventory, which describes the appearance of the Forest at this point in time.

The most obvious and significant effects on the visual resource are from vegetation and landform alterations typically associated with resource management activities such as timber harvest, road construction, recreation facility development and mineral exploration and development.

It should be noted that the visual effects of timber harvest activities are not limited to the activity alone. The harvest activity, as seen from a travel route or use area, affects the visual appearance of the entire landscape visible from that route or area. For these reasons, the quantifiable visual effects are greater than the acres of tentatively suitable forest land.

EFFECTS OF ALTERNATIVES

Alternative A. This alternative provides protection and mitigation for many of the scenic landscapes on the Tongass and includes the requirements of H.R. 987 which would designate 23 new areas to Wilderness. This alternative also would designate the Alaska Marine Highway as a Scenic Byway and provide protection of inventoried recreation places. Implementing this alternative would play a great part in maintaining the scenic landscapes on the Tongass. Reducing the allowable sale quantity would provide greater latitude in maintaining natural appearing landscapes in visually sensitive areas.

Seventy-three percent of the Forest would remain in a pristine visual condition (EVC Type 1). Table 3-128 below illustrates the assigned VQO's by distance zone and their distribution. In areas close to the viewer (foreground), sixty-seven percent of the area would be in Retention, twenty-eight percent in Partial Retention. In the middleground distance, forty-six percent would be in Retention, with fifty-two percent in Partial Retention.

TABLE 3-128
ALTERNATIVE A VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	635,000	263,000	43,000	0
Middleground	1,286,000	1,466,000	50,000	0
Background	243,000	281,000	2,000	9,000
Not Seen	3,169,000	1,164,000	148,000	1,128,000
Wilderness[1]	7,288,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

Alternative B. In this alternative, the Alaska Marine Highway is also designated a Scenic Byway, and in comparison to Alternatives C, D, E, F and G provides more protection for the natural landscapes on the Tongass. In particular, this alternative provides the best ability to maintain scenic landscapes through allocating the greatest quantity of the following management prescriptions. Research Natural Areas, Beach Fringe, Primitive Recreation and Scenic Viewshed. Currently designated Wilderness areas would continue to provide scenic landscapes on the Tongass.

Sixty-nine percent of the Forest would remain in a pristine visual condition (EVC Type 1) with the implementation of this alternative. The Timber Production prescription is allocated to areas currently under intensive management (as in the long-term sale areas on Prince of Wales Island, Kuiu Island, Cleveland Peninsula, etc.) and would result in a highly modified environment. Eleven percent of the areas which are currently pristine (EVC Type 1) would appear noticeably altered (EVC Type 6) 10-50 years following Forest Plan implementation.

TABLE 3-129
ALTERNATIVE B VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	707,000	338,000	50,000	97,000
Middleground	1,427,000	1,633,000	56,000	371,000
Background	276,000	331,000	2,000	33,000
Not Seen	3,379,000	909,000	151,000	1,887,000
Wilderness*	5,470,000			

Source: Revision Database Q47D1 & Q235L2
***Wilderness Areas contribution to maintaining natural scenic landscapes.**

Alternative C. Representing the current Forest Plan, this alternative provides for mitigation of visual resource concerns adjacent to communities through the application of the Scenic Viewshed, Visual-Timber and Roaded Natural management prescriptions to areas currently allocated to LUD III. However, to meet the ASQ and the continued timber supply to long-term sale contracts, the visual appearance of landscapes in areas currently allocated LUD IV would be dominated by harvest activities. Twenty percent of the areas which are currently pristine (EVC 1) would appear to be noticeably altered 10-50 years following Forest Plan implementation.

TABLE 3-130
ALTERNATIVE C VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	390,000	224,000	175,000	404,000
Middleground	987,000	962,000	436,000	1,089,000
Background	206,000	181,000	46,000	222,000
Not Seen	2,582,000	907,000	343,000	2,494,000
Wilderness[1]	5,470,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

From this table, thirty-four percent of the foreground landscapes would be managed for Maximum Modification VQO, with thirty-three percent in Retention and nineteen percent in Partial Retention.

Alternative D. With the implementation of this alternative, the Forest visitor could expect to see a highly modified environment in all distance zones. Having the highest Allowable Sale Quantity (550 MMBF), this alternative provides the least mitigation for visual resource concerns. This alternative provides the least of the Scenic Viewshed, Visual-Timber, Old Growth and RNA Management Area prescriptions.

Twenty-seven percent of the areas which are currently in a pristine visual condition would appear noticeably altered after 10-50 years with the implementation of this alternative.

TABLE 3-131
ALTERNATIVE D VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	260,000	336,000	83,000	514,000
Middleground	654,000	1,083,000	63,000	1,687,000
Background	65,000	263,000	12,000	302,000
Not Seen	1,009,000	2,040,000	161,000	3,117,000
Wilderness[1]	5,470,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

Alternative E. In this alternative, the 23 wilderness areas proposed in H.R. 987 are applied to the current Forest Plan (Alternative C). From the visual resource perspective, this alternative would allow for greater latitude in maintaining natural appearing landscapes in visually sensitive areas. Outside these areas, management of the Tongass would be comparable to Alternative C.

TABLE 3-132
ALTERNATIVE E VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	292,000	164,000	134,000	343,000
Middleground	848,000	750,000	309,000	871,000
Background	181,000	123,000	39,000	190,000
Not Seen	2,366,000	740,000	315,000	2,165,000
Wilderness[1]	7,288,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

Alternative F. This alternative would have similar impacts to the visual resource as those described in Alternative C. Some additional protection for natural appearing visual resource values would be provided in allocating the "12 Protected Areas" as proposed in the original Southeast Conference proposal (3/89) to No Harvest management prescriptions.

TABLE 3-133
ALTERNATIVE F VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	473,000	208,000	149,000	363,000
Middleground	1,271,000	888,000	354,000	974,000
Background	235,000	155,000	46,000	206,000
Not Seen	2,781,000	875,000	341,000	2,329,000
Wilderness[1]	5,470,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

Alternative G. This alternative would have similar consequences to the visual resource as those described in Alternative F. Additional protection for scenic quality is provided through allocating much of the "16 Protected Areas" proposed by the Southeast Conference to No Harvest management prescriptions.

TABLE 3-134
ALTERNATIVE G VQO's BY DISTANCE ZONE

Distance Zone	*Retention*	*Partial Retention*	*Modification*	*Maximum Modification*
Foreground	466,000	206,000	148,000	373,000
Middleground	1,275,000	856,000	341,000	1,015,000
Background	243,000	146,000	43,000	209,000
Not Seen	2,712,000	880,000	338,000	2,396,000
Wilderness[1]	5,470,000			

Source: Revision Database Q47D1 & Q235L2
[1]Wilderness Areas contribution to maintaining natural scenic landscapes.

Table 3-135 compares the assigned visual quality objectives of the Alternatives, based on the potential effects of applying the Standards & Guidelines in the management area prescriptions.

TABLE 3-135
ASSIGNED VISUAL QUALITY OBJECTIVES BY ALTERNATIVE

VQO	Distance Zone	Inventory Acres	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
P	All Distances	5,469,956	7,288,169	5,469,956	5,469,956	5,469,956	7,172,127	5,469,956	5,469,956
R	Foreground	526,726	635,004	707,177	389,739	260,186	291,526	473,480	466,173
	Middleground	701,424	1,286,054	1,426,818	987,257	654,191	848,436	1,271,195	1,274,934
	Background	178,940	243,364	276,379	206,363	65,327	181,349	235,382	243,463
	Not Seen	600	3,169,164	3,378,896	2,581,570	1,008,650	2,366,315	2,781,023	2,712,346
PR	Foreground	584,391	263,356	338,323	223,831	335,542	163,512	207,843	205,741
	Middleground	1,949,388	1,466,169	1,633,443	961,752	1,082,742	749,523	887,643	855,640
	Background	307,442	280,724	331,133	181,252	263,250	122,521	155,340	146,108
	Not Seen	2,150,690	1,164,003	908,574	907,245	2,039,672	740,033	875,158	879,983
M	Foreground	81,320	42,584	49,783	175,107	83,066	134,383	148,723	147,620
	Middleground	835,095	49,610	56,118	435,725	62,549	308,903	353,643	340,867
	Background	143,024	1,942	1,702	45,851	11,696	38,720	45,811	43,489
	Not Seen	1,935,465	148,256	151,294	343,260	160,886	315,266	340,737	337,593
MM	Foreground	2,067	60	97,356	403,960	513,904	342,908	362,590	373,103
	Middleground	3,445	240	370,555	1,089,229	1,687,454	871,272	974,455	1,015,495
	Background	13,621	8,998	33,233	222,131	302,174	189,886	205,914	209,388
	Not Seen	2,024,358	1,128,068	1,887,029	2,493,716	3,116,582	2,165,043	2,328,872	2,395,868

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Future Visual Condition. Table 3-136 displays the future visual condition of the Forest by alternative ten years following implementation. The far left column describes the current Existing Visual Condition (EVC) inventory in acres of Type 1 through 6, providing the reader a basis for comparison of the alternatives.

As defined earlier, an EVC Type 1 rating applies to those lands where only ecological change has occured, EVC Type 4 describes those landscapes where change is strong and obvious to the visitor, and EVC Type 6 applies to those areas where change is in glaring contrast to the landscape's natural appearance.

Across the top of each chart are the Future Visual Condition types which would be attained with the implementation of the specific alternative. For example, in Alternative A, 15,315,060 acres are currently in a pristine visual condition (Type 1), and with the implementation of this alternative the visual condition of 781,093 acres would be subject to disturbance (Type 6) as suitable forest lands are harvested. Of the 82,984 acres currently inventoried in Type 6, 26,316 would remain in a disturbed visual condition at the end of ten years, while the remaining acres would recover to a less disturbed EVC (Type 5 or Type 4). This table illustrates the relationship of the Forest's current visual condition to the resulting future visual condition by alternative. It should be noted that visual effects measured by the Existing Visual Condition may significantly exceed the number of acres directly modified since what is being measured is the apparent disturbance in the *scene*, not just the acres harvested.

TABLE 3-136
FUTURE VISUAL CONDITION COMPARED TO THE CURRENT VISUAL CONDITION

ALTERNATIVE A

Existing Visual Condition	*Acres*	*Future Visual Condition Type* 1	2	3	4	5	6
Type 1	15,315,000	11,211,000	917,000	2,343,000	39,000	23,000	781,000
Type 2	44,000	24,000	11,000	6,000	2,000	0	1,000
Type 3	145,000	0	63,000	67,000	10,000	1,000	5,000
Type 4	378,000	0	0	313,000	6,000	1,000	58,000
Type 5	915,000	0	0	0	678,000	16,000	221,000
Type 6	83,000	0	0	0	0	57,000	26,000
Total	16,880,000	11,235,000	991,000	2,729,000	735,000	98,000	1,092,000

ALTERNATIVE B

Type 1	15,315,000	10,596,000	340,000	2,646,000	46,000	30,000	1,659,000
Type 2	44,000	21,000	5,000	14,000	2,000	0	2,000
Type 3	145,000	0	54,000	55,000	10,000	4,000	22,000
Type 4	378,000	0	0	249,000	6,000	5,000	117,000
Type 5	915,000	0	0	0	488,000	23,000	404,000
Type 6	83,000	0	0	0	0	40,000	43,000
Total	16,880,000	10,617,000	399,000	2,964,000	552,000	102,000	2,247,000

ALTERNATIVE C

Type 1	15,315,000	8,888,000	601,000	2,106,000	662,000	11,000	3,047,000
Type 2	44,000	10,000	9,000	9,000	7,000	0	8,000
Type 3	145,000	0	34,000	24,000	20,000	0	66,000
Type 4	378,000	0	0	136,000	25,000	0	217,000
Type 5	915,000	0	0	0	336,000	6,000	573,000
Type 6	83,000	0	0	0	0	16,000	67,000
Total	16,880,000	8,898,000	634,000	2,275,000	1,050,000	33,000	3,978,000

ALTERNATIVE D

Type 1	15,315,000	7,289,000	66,000	3,665,000	80,000	11,000	4,204,000
Type 2	44,000	16,000	2,000	10,000	4,000	0	12,000
Type 3	145,000	0	22,000	30,000	15,000	0	77,000
Type 4	378,000	0	0	100,000	8,000	0	269,000
Type 5	915,000	0	0	0	219,000	6,000	691,000
Type 6	83,000	0	0	0	0	10,000	73,000
Total	16,880,000	7,305,000	90,000	3,805,000	326,000	27,000	5,326,000

TABLE 3-136 (Continued)
FUTURE VISUAL CONDITION COMPARED TO THE CURRENT VISUAL CONDITION

ALTERNATIVE E							
Existing Visual			*Future Visual Condition Type*				
Condition Acres		*1*	*2*	*3*	*4*	*5*	*6*
Type 1	15,315,000	10,326,000	454,000	1,586,000	467,000	11,000	2,470,000
Type 2	44,000	20,000	6,000	6,000	5,000	0	7,000
Type 3	145,000	0	38,000	23,000	19,000	0	64,000
Type 4	378,000	0	0	152,000	24,000	0	201,000
Type 5	915,000	0	0	0	346,000	6,000	563,000
Type 6	83,000	0	0	0	0	16,000	67,000
Total	16,880,000	10,346,000	498,000	1,767,000	861,000	33,000	3,372,000

ALTERNATIVE F							
Type 1	15,315,000	9,507,000	555,000	1,944,000	554,000	11,000	2,745,000
Type 2	44,000	14,000	9,000	8,000	5,000	0	8,000
Type 3	145,000	0	37,000	24,000	20,000	0	64,000
Type 4	378,000	0	0	145,000	25,000	0	208,000
Type 5	915,000	0	0	0	459,000	6,000	567,000
Type 6	83,000	0	0	0	0	16,000	67,000
Total	16,880,000	9,521,000	601,000	2,121,000	1,063,000	33,000	3,659,000

ALTERNATIVE G							
Type 1	15,315,000	9,481,000	531,000	1,911,000	534,000	11,000	2,847,000
Type 2	44,000	13,000	9,000	8,000	6,000	0	8,000
Type 3	145,000	0	35,000	24,000	20,000	0	66,000
Type 4	378,000	0	0	137,000	25,000	0	215,000
Type 5	915,000	0	0	0	461,000	6,000	570,000
Type 6	83,000	0	0	0	0	16,000	67,000
Total	16,880,000	9,494,000	575,000	2,080,000	1,046,000	33,000	3,773,000

The Alaska Marine Highway. Table 3-137 describes how the areas seen from this travel route would be managed in terms of Visual Quality Objectives by alternative. The allocation of Management Prescriptions vary by alternative with their emphasis and theme.

TABLE 3-137
VISUAL QUALITY OBJECTIVES AS SEEN FROM THE ALASKA MARINE HIGHWAY

VQO	*Alt A*	*Alt B*	*Alt C*	*Alt D*	*Alt E*	*Alt F*	*Alt G*
P	87,000	0	0	0	87,000	0	0
R	296,000	256,000	158,000	99,000	146,000	193,000	194,000
PR	586,000	711,000	397,000	348,000	374,000	386,000	384,000
M	18,000	20,000	184,000	30,000	165,000	169,000	164,000
MM	0	0	248,000	510,000	215,000	239,000	245,000

Source: Revision Database: Q47D2

Alternatives A and B would provide the greatest protection for the natural appearing scenic landscapes as viewed from the ferry lane. Ninety-eight percent of the seen area would be within areas designated Preservation, Retention or Partial Retention Visual Quality Objectives. In contrast, Alternative D allocates forty-five percent of the landscapes to visually compatible management prescriptions, while Alternatives C, E, F and G fall in the fifty-six to sixty- two percent range. Nomination and designation of the Marine Highway as a Scenic Byway could occur with any of the alteratives as demonstrative of multiple use management, although the extent of projected visual change may be considered in a nomination decision.

Visual Change in Recreation Places. Recreation places are geographical areas which have one or more features that are attractive to persons engaged in recreation activities. They may be lakes or beaches, streamside or roadside areas, trail corridors, cabin sites, campgrounds or other developed recreation sites. For further description, see the discussion in Recreation.

Table 3-138 illustrates the Visual Quality Objectives by alternative that would be applied within the inventoried recreation places. It can be used to measure the degree of visual change that could occur within the recreation places, an important element of recreation experience quality.

For example, in Alternative A, 515,262 acres would be in a Retention VQO setting (where activities are not evident to the observer). The visual quality of most recreation places remains unaltered. In contrast, Alternative C provides 237,297 acres of Retention, with the visual setting of many recreation places substantially modified. Alternative D affects the visual setting within the greatest number of recreation places; 340,567 acres of recreation places would be in

areas of Maximum Modification (heavily altered). In contrast, in Alternatives A and B, Maximum Modification is not applied to any recreation places.

TABLE 3-138
VISUAL QUALITY OBJECTIVES OF INVENTORIED RECREATION PLACES

VQO	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
P	295,000	1,000	1,000	1,000	311,000	1,000	1,000
R	515,000	578,000	299,000	237,000	232,000	449,000	486,000
PR	535,000	759,000	306,000	718,000	243,000	281,000	257,000
M	41,000	47,000	462,000	89,000	347,000	373,000	354,000
MM	0	0	318,000	341,000	252,000	283,000	288,000

Source: Revision Database: Q47D3: April 17, 1990

Relationships with other Agency Plans or Policies

In some viewsheds there may be differences between national forest objectives and those of adjacent landowners or other land management agencies, such as the State of Alaska. The Tongass National Forest coordinates with a number of other agencies to ensure consideration of the visual resource along state and federal highways and utility corridors and electronics sites. To identify potential conflicts and further coordination between other agencies and the USDA Forest Service, a number of operation and maintenance plans are reviewed, including those of the Army Corps of Engineers, Alaska Power Administration and Alaska Department of Fish and Game.

State of Alaska Marine Park System. AS41.21.300 established marine park units of the Alaska State Park system (effective July 16, 1983, and amended July 1, 1986). The primary purposes of the marine park system are to:

Maintain natural, cultural and scenic values,
Maintain fish and wildlife resources, and
Promote and support recreation and tourism in the State.

The alternatives proposed in the Forest Plan Revision would have differing effects to the lands visible from the Marine Parks. Currently, there are 19 designated parks, ranging from the Chilkat Islands to the north to Dall Island to the south.

Each alternative was evaluated by comparing the management area allocations to the objectives of the Marine Park program. Those management prescriptions which are felt to be compatible with the intent of the program are: Scenic Viewshed, Visual/Timber, Primitive Recreation, Semi-Primitive Recreation and Wilderness. Overall, Alternatives A, B, E, F and G would have a moderate to high probability of being consistent with the purposes of the marine park program. During the evaluation, the above mentioned management areas were found to

be adjacent to most of the established marine parks. Alternatives C and D provide for management activities which are not likely consistent with the intent of the Marine Park program (e.g. Timber Production and Roaded Natural/Rural Recreation prescriptions).

MITIGATION

The appearance of the landscape will change as management activities are implemented to fulfill Plan objectives. Several published visual resource handbook guides, such as "National Forest Landscape Management, Volumes 1 and 2", specify mitigation methods for the visual resource to be considered and implemented during site-specific project analysis.

In all alternatives, Forest-wide standards and guidelines for visual quality (see Appendix G) will be applied to activities consistent with the objectives of each management prescription. Where land- or vegetation-altering activities need to be planned and conducted to meet visual quality objectives, management prescriptions (such as Scenic Viewshed or Visual-Timber) which emphasize scenic quality are applied. This, of course, varies by alternative.

WATER

AFFECTED ENVIRONMENT

The Tongass National Forest is characterized by an abundance of water. Great quantities of water fall primarily as rain at the lower elevations and snow at the higher elevations. Much of the snow builds into glaciers which cover portions of the coastal mainland. The Tongass is influenced by the oceans and salt water. Thousands of miles of marine (salt water) shoreline and hundreds of bays and inlets, characterize the water environment of the Tongass. The movement of water from the oceans to the clouds, to precipitation on land, and to it's return to the ocean forms the hydrologic cycle. This cycle is dominated by a maritime climate which brings precipitation nearly year-round, with the heaviest amounts from September through January.

Coastal low-elevation rain forests thrive in this maritime climate. Any physical activity in the environment affects the hydrologic cycle in some manner, but the principal points of interaction are climate, streamflow, water quality and water use. The water resources of the Forest can be described as: climate, streamflow regimen, water quality, floodplains, wetlands, water use, and riparian areas.

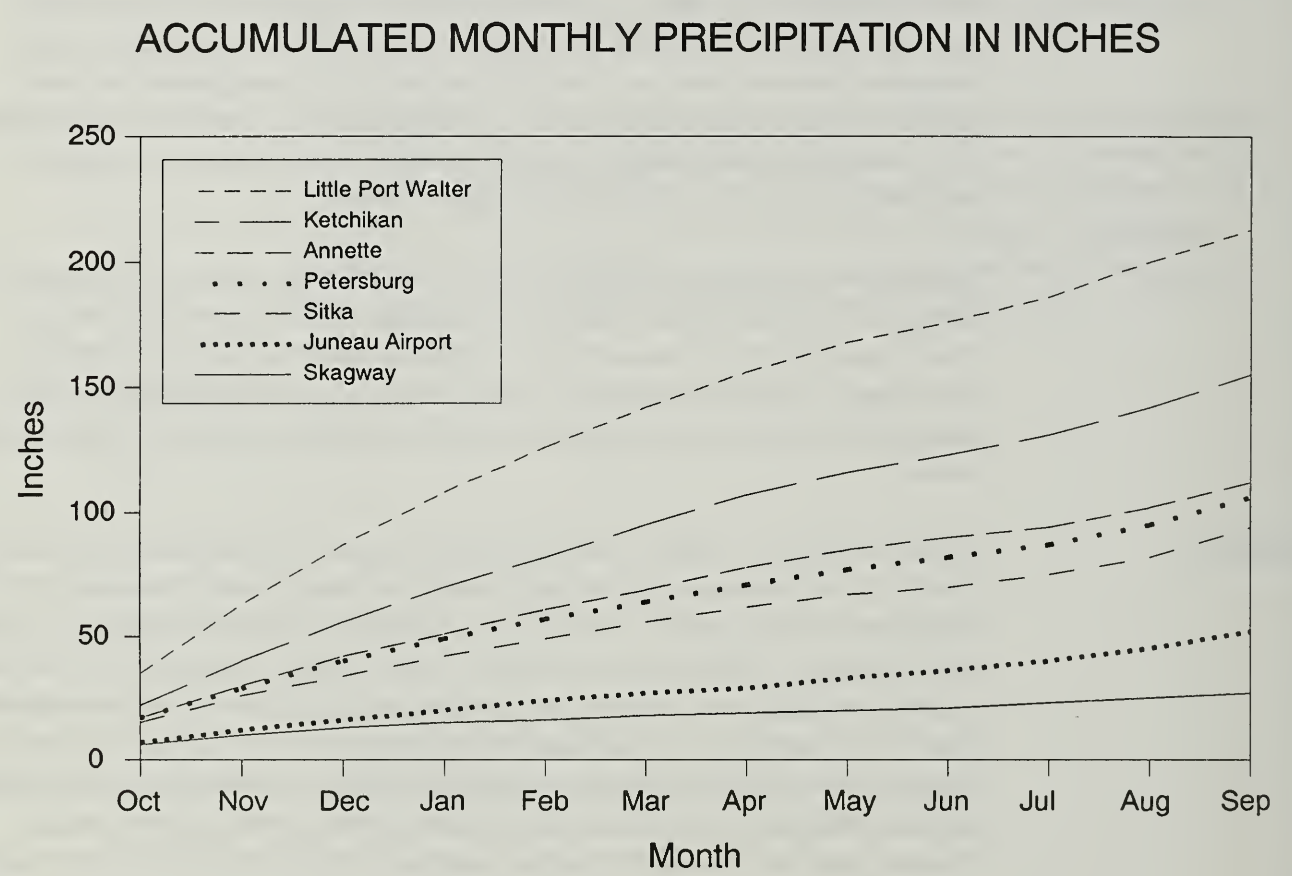
CLIMATE

Dominant pressure cells, known as "Aleutian Lows," are spawned in the North Pacific by the Japanese current and cold Arctic down drafts. Offshoots of the cells move southeastward and push into Alaskan and British Columbian coastal areas, bringing relatively warm, moist air. When these pressure cells meet the rugged coastline, they produce strong winds and large amounts of precipitation. Sea level precipitation in Southeast Alaska ranges from 30 inches per year at Skagway to 220 inches per year at Little Port Walter. It is estimated that average annual precipitation may be as high as 400 inches on the southern end of Baranof Island and about 260 inches over the Juneau Icefield. Southeast Alaska has complete cloud cover about 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast.

The yearly distribution of precipitation is quite uniform over Southeast Alaska, although different areas receive different amounts. Precipitation exceeds evapotranspiration in all months of most years over most of southeast Alaska. Throughout Southeast Alaska, October is generally the wettest month. High precipitation persists as rain through the middle of November, when intermittent snowfall begins. In the south half of the panhandle, snow accumulation below 500 feet in elevation is short-lived, generally melting off within a few days because of warmer temperatures and rain. In the northern part of the panhandle, low elevation snow packs persist from December thru March. At the higher elevations throughout the Forest, the snow cover usually persists until the spring. From

the latter part of March through June, precipitation as rain continues to decrease. May through July are, on the average, the drier months. Rain becomes more frequent and of greater duration during September. Accumulated monthly precipitation trends are shown for eight Southeast stations in Figure 3-53.

FIGURE 3-53



Source: Climatography of the United States No. 81-4. Decennial Census of U. S. Climate

The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average 32 degrees in the winter and 60 degrees in the summer.

STREAM REGIMEN

Glacial and non-glacial rivers and stream systems occur on the Tongass National Forest. Most of the glacial rivers are located on the mainland and have their origins in the glaciers and snowfields of the Coast Range. Some of the largest of the mainland rivers have glacial origins in Canada. Unlike the rivers and streams of the islands, which generally drain in an east or west direction into tidewaters, these mainland rivers, for the most part, flow westward.

Streams and rivers produce a large volume of water per unit of land. Runoff varies greatly between the mainland and island rivers and stream systems. Runoff from streams that are glacially-fed usually starts in June, in response to snow and ice melt, reaching peak flows in July and August. Runoff drops rapidly in October due to colder temperatures at higher elevations, and low flows occur from December through April. Runoff from nonglacial streams from the islands and the Yakutat Forelands tends to respond to high precipitation events; therefore, the highest flows tend to be in October and December and the lowest flows between Janauary and March, and mid-May to August.

In the early 1980's the Forest developed a stream channel classification system called channel typing. Channel types define discrete segments of streams and rivers based on gradient, substrata, streambank vegetation, and other parameters. This system provides a process to map and classify streams in terms of important management parameters. These parameters can then be used to predict the response of different channel types to human- or naturally-caused changes. This also allows categorization of stream and lake habitats into distinctly different groups, called process groups, which are useful for assessing watershed condition, fish habitat production capability, and sensitivity to management activities. These process groups are described in Appendix J.

The Forest has an estimated 42,429 miles of mapped streams. These estimates are based on a complete inventory of all non-wilderness areas, and an estimate for most Wilderness. Unmappable streams at the present level of channel type inventory are typically very small, but may contain valuable aquatic habitat.

WATER QUALITY

Changes in any of the physical or chemical properties of water can directly affect water use by people, fish or wildlife. The most important water quality characteristics are temperature, sediment, dissolved oxygen, and introduction of foreign chemicals. These water quality characteristics are discussed below.

Sediment

Sediment is water-transported earth material. Sediment may be transported as either suspended load or bedload. Suspended sediment is carried within the water column, while bedload material moves (rolls or bounces) along the bottom of the streambed or riverbed. Suspended sediment, which is carried in the water column, causes the turbid or murky appearance of the water. Under natural conditions the great majority of suspended load and bedload transport

occurs during storm runoff events. The rate of sediment transport is dependent on discharge velocity and material availability.

Sediment production is controlled by natural geologic processes and can be accelerated by management activities. Soil mass movements (landslides), streams cutting new channels, and bank erosion are the main natural processes creating sediment. Landslides cause large, but temporary, increases in suspended and bedload sediments. Stream and river bed or bank erosion may contribute to sediment over long periods of time. Steep terrain and large amounts of rainfall make the land sensitive to natural sediment production, and to sediment produced by road construction and timber harvesting activities. Factors limiting or decreasing sediment production include coarse-textured soils with thick organic surface layers, high soil permeability and infiltration, and conditions that favor rapid revegetation of disturbed soil. In addition, all roads are constructed of blasted quarry rock and nearly all logging uses cable yarding systems to minimize the disturbance of soil surface layers. Overland flow is limited to areas where the mineral soil is exposed, to saturated depressions, or in barely-definable ephemeral channels.

In Southeast Alaska suspended sediment loads of non-glacial streams in undisturbed watersheds are very low. Concentrations of suspended sediments normally are less than 10 parts per million (ppm) in winter, four to 30 ppm in summer, and occasionally over 100 ppm in the fall during storm runoff periods. These low levels are attributed to the dense vegetative ground cover.

Suspended sediment in glacial streams is highly dependent on the volume of water flow from snow and ice melt. At high flows, concentrations may reach from 200 to more than 600 parts per million (ppm); and midrange flows may contain 20-100 ppm. Because the amount of glacial melt water is lowest between November and April, suspended sediment concentrations from November through April seldom exceed 20 ppm.

Suspended sediment information on the results of management activities is limited, especially for timber harvest and road construction activities. The present knowledge is documented in the following discussions of actual project monitoring.

Suspended sediment loads were low in two heavily logged watersheds. In these watersheds near Hollis, where clearcuts exceeded 2,000 acres in size, suspended sediments during and following logging in the Harris River never exceeded 3.7 ppm under average flow conditions or 148 ppm during peak flows. In the Maybeso watershed, suspended sediments never exceeded 7 ppm during average flow or 38 ppm during peak flows.

In the investigations of bridge installations across streams, data was gathered before, during, and after construction. In 1977 a sedimentation monitoring study was conducted at Bonnie Creek on Prince of Wales Island while equipment worked within the confines of the stream installing bridge stringers (Bartos 1990). Best Management Practices (BMP's) to protect water quality (discussed later under Mitigation) were not used. Samples taken approximately 100 feet downstream during the construction indicated a sediment discharge of 219 parts per million. Background sampling upstream for the construction found sediment discharge of only 0.2 ppm. The average discharge was 147 cubic feet per minute at the time of the investigation. This investigation showed that without application of BMP's, a significant increase in sedimentation occurred over background levels for a short period of time.

In March 1978 an investigation of a small bridge installation showed insignificant increases in sediment with the use of Best Management Practices. During this bridge installation, heavy equipment was restricted to a one-time stream crossing and was required to sit on pads while in the stream. Two days of sediment measurements immediately downstream of the construction site measured 16.5 to 76.5 and 34 to 99.8 ppm respectively. The background level of sediment transport for the two days of investigation was 0.85 and 0.25 parts ppm respectively. There also was a 61 percent dropout rate within a 100-foot reach below the construction site. Discharge through the area of construction and during the sampling period ranged from 6.73 cubic feet per second the first day to 5.58 cubic feet per second on the second day.

Paustian (1987) reported effects of sediment yields from application of BMP's in harvesting and roading in 11 square miles of the Indian River Watershed, and roading in three first and second order watersheds (30 to 80 acres) of the Kadashan Watershed. Both of these major watersheds are located opposite each other in Tenakee Inlet.

The results of the monitoring investigation in the Indian River Watershed indicated estimates of annual suspended sediment yields of 796 and 979 tons respectively for the water years 1980 and 1981. These values where within the range of suspended sediment yields of 475 and 1,103 tons during the pre-logging baseline period of the water years 1978 and 1979. Regression analysis comparing suspended sediment concentration and discharge measurements showed no detectable change in suspended sediment delivery during the first two years of logging activities in the watershed.

At the time of the report, no timber harvest activity had taken place in the Kadashan drainages and the road had not been used by heavy trucks. Paustian reported that little deposition of sediment was observed in the sediment settling basin in the first year, but road construction did cause short-term increases in suspended sediment transport downstream of the sediment basins. During the post-road

period, sediment yields were observed in the three streams of +.5 tons, +1.5 tons, and +4 tons, equating to a 20 percent, 33 percent, and 66 percent increase, respectively, compared to the pre-road period. Due to the short period of investigation record, it was impossible to determine statistically how much of this observed sediment increase could have been attributed to road construction activity, and what portion to natural variations in sediment yield.

These monitoring investigations demonstrate the variability in sediment from natural and land management activities. They demonstrate the success of Best Management Practices (BMPs) in keeping sediment from logging and road construction to levels within the range of natural sediment yields.

Water Temperature

Stream temperature is a principal regulator of biological activities in the aquatic environment. Fish, and most other aquatic organisms, assume the temperature of the water in which they live. The metabolic activity of fish and other aquatic organisms is therefore controlled by water temperature. This activity proceeds most efficiently within a limited temperature range. The State of Alaska Water Quality Standards describe the upper limits as 15°C (58°F) for fish migration, 13°C (56°F) for spawning, egg, and fry stages, and 59°F for rearing (18 AAC 70.020, 1973).

The principal source of heat for small streams is solar energy striking the stream surface directly. Most Southeast Alaska streams are not highly sensitive to temperature changes. Frequent cloudiness, low air temperatures, steep channel gradients, and frequent precipitation generally keep stream temperatures below the range considered harmful to fish. Summer temperatures in main channel streams normally range from 6° C (37° F) to 11° C (52° F), but may occasionally exceed 15° C (59° F); winter temperatures typically range from 0°C (32° F) to 6° C (37° F).

Even though streams in Southeast Alaska are not very sensitive to temperature changes, each stream's sensitivity depends on its own characteristics. These characteristics include streamflow, stream surface area, and the nature of the streambed. In addition, streamside vegetation, water source and aspect are involved in a stream's sensitivity to temperature changes. Streams are considered temperature sensitive when one or more of the above characteristics changes, allowing the temperature to exceed the State Water Quality Standard for an extended period sufficient to affect fish production. Potentially temperature-sensitive streams in Southeast Alaska typically have one or more of the following characteristics: runoff sources are extensive areas of muskegs or lakes; the stream aspect is southerly; channels are shallow and wide with sluggish or intermittent flows; and channels have extensive beaver ponds. Sensitivity increases from north to south on the Forest.

Dissolved Oxygen

Dissolved oxygen is typically at or near saturation in streams due to their self-aeration characteristics. In many lakes and in streams which have smooth, low flows, oxygen concentrations may drop below saturation. Such decreases in dissolved oxygen saturation usually occur in summer dry periods with higher water temperature, when natural biotic demand for dissolved oxygen is at its peak.

Water Chemistry

Water in Southeast Alaska is never completely free of organic and inorganic matter, due to the fact that water, a solvent and a mechanical erosive agent, contains many dissolved minerals as well as undissolved sediments. The chemical water quality in Southeast Alaska is high. Total dissolved solids concentrations are typically less than 150 ppm, well within the State of Alaska Water Quality Standards.

In the past, there has been little if any introduction of foreign chemicals into surface water of the Forest, whether from fertilizers and herbicides or from accidents involving commercial transportation of toxic substances and petroleum products. The main threats of foreign chemical pollutants in the Forest are from mining activities, petroleum product spills, and logging operations.

FLOODPLAINS

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. In addition, agencies are required to (1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives, (2) evaluate the potential effects of any proposed action on floodplains, (3) ensure planning programs and budgets requests reflect consideration of flood hazards and floodplain management, and (4) prescribe procedures to implement the policies and requirements of the Order.

Floodplains are usually built of naturally-eroded sediments carried by the stream or river and deposited in slack water sections of channels during high water periods. Floodplains are considered to be areas subject to a one percent (100-year recurrence) or greater chance of flooding in any given year. Nutrient-rich sediments underlain by coarse-textured sediments make floodplains the most productive lowland timber, wildlife and fisheries resource sites on the Forest.

The floodplains on the Forest are typically found in broad, flat, alluvial U-shaped valleys, are forested, and usually support plant communities having an overstory of Sitka spruce or Sitka spruce and western hemlock. The shrub understory is variable and includes blueberry, skunk cabbage, devil's club, salmonberry and alders. The herb understory is dominated by ferns and broadleaf plants of varying species. Supporting this vegetation are well, moderately well, or somewhat poorly drained deep mineral soils with thin organic surface layers. Floodplains

are associated with 21 percent of the 42,429 linear miles of the streams mapped on the Forest.

Flooding may occur in a diversity of land types including steep, narrow mountain canyons, wide, flat alluvial valleys, lake shore's, coastal areas and alluvial fans. The potential flooding sites in the Tongass National Forest are the varying width floodplains and terraces of the valley bottoms of U-shaped valleys. To date, no area-wide flood hazard or flood insurance studies have been conducted in the Forest. Soils and landform inventory data are the only available information for making initial determinations of the location and approximate boundaries of floodplain areas.

WETLANDS

Executive Order 11990, as amended (42 U.S.C. 4321 et.seq.), requires Federal agencies that exercise statutory authority and leadership over Federal lands to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for (1) acquiring, managing, and disposing of lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use.

The Army Corps of Engineers (COE) (Federal Register 1982) and the Environmental Protection Agency (EPA) (Federal Register 1980) jointly define wetlands as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The two agencies (COE and EPA) signed a Memorandum of Agreement that provides clarification and general guidance regarding the level of mitigation necessary to demonstrate compliance with the Clean Water Act in connection with Standard Section 404 dredge and fill permits. The President's Domestic Policy council is charged with developing recommendations regarding the attainment of the goal of no net loss of the Nations's wetlands. The Domestic Policy council group will consider the challenges posed in Alaska where a high proportion of developable land is wetlands, and where technical difficulties exist regarding opportunities for compensatory mitigation.

The Forest's objective is to support the President's Domestic Council assignment to develop recommendations regarding attainment of the goal of no net loss of the nation's wetlands, considering the challenges posed in Alaska where a high proportion of the developable land is wetlands.

The Corps of Engineers Wetlands Delineation Manual (Army Corps of Engineers 1987) provides the standards for determining areas of wetlands and deepwater habitats. In addition, DeMeo and Loggy (Unpub. Paper, 1989) have classified wetlands water habitats on the Tongass National Forest. Land areas were defined as wetlands when soil, hydrology, and vegetation all met the technical criteria for establishing wetlands. Streams and lakes where classified using the criteria of Cowardin (1979), from stream and lake inventory data from the Forest's channel type inventory system. (See Chapter 3, "Water," Analysis of the Management Situation, Tongass National Forest, January 1990 for a more detailed discussion.)

Wetland functions include flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality protection. In the Forest, wetlands are made up of forested sites on both poorly and very poorly drained organic and poorly and somewhat poorly drained mineral soils. Open sites of herbaceous plants are found on poorly and very poorly drained organic soils (muskegs). Wetlands range from sea level to alpine and may include estuaries.

Wetland systems and classes are described briefly below, with amounts of each listed in Table 3-139.

TABLE 3-139
ACRES OR MILES BY WETLAND SYSTEMS AND CLASS

Wetland Systems	*Wetland Classes*	*Acres* [1]	*Miles* [1]
Palustrine	Muskeg	1,145,566	
	Forested	1,379,173	
	Scrub-shrub [2]	435,301	
Estuarine		20,719	
Riverine			42,429
Lacustrine		268,000	
Total Wetlands		3,248,759	42,429

Source. Revision Database. Compiled from soil and channel typing inventory data.
[1] Represents the acres of wetlands that have been mapped in wilderness and non- wilderness areas on the Forest.
[2] 153,198 acres of Scrub-shrub meet the Forest Services's criteria of being forested lands. These forested lands are classified as Scrub-shrub wetlands because the trees are less than 20 feet in height.

Palustrine System

The Palustrine wetland systems include the vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens and prairies. They include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to

ocean-derived salts is below 0.5 percent. Classes of the Palustrine wetland system include moss-lichen and emergent wetlands (muskegs), scrub-shrub wetlands and forested wetlands. Classes are described in the following paragraphs.

Muskeg Class. Muskegs comprise 35 percent of the total mapped wetland area on the Forest. They are the most unique and distinct of the Palustrine wetlands. The term "muskeg" according to Hanson (1962) denotes a bog in the northern part of North America characterized by an abundance usually of sphagnum moss and greater or lesser abundance of shrubs and low trees such as black spruce. In Southeast Alaska, all relatively open bogs that have a groundcover high in sphagnum mosses and/or sedges are called "muskegs."

Forested Class. Forested wetland areas comprise 43 percent of the total Class mapped wetland acres. Soil drainage on these wetland areas, depending on soil type, ranges from poorly to somewhat poorly drained. Vegetation ranges from scrubby mixed conifer forests (greater than 20 feet high) on the poorly drained sites to medium productive stands of mixed conifers, western hemlock, mountain hemlock or a mixture of western and mountain hemlock trees on somewhat poorly drained sites. The understory is dominated by shrubs and forbs.

Scrub-Shurb Class. Scrub-shrub wetlands areas are the most vegetatively varied wetland classes in Southeast Alaska. They comprise 13 percent of the total mapped wetland acres. Soil drainage on these wetland areas, depending on soil type, ranges from very poorly to poorly drained. Depending on the habitat type, these wetland areas are dominated by woody vegetation less than 20 feet tall. Plant species may include true shrubs, young trees, and tree and/or shrubs that are small or stunted because of environmental conditions. Scrub-shrub wetlands are associated with three broad wetland plant communities named scrub-shrub alder/willow, scrub-shrub evergreen/muskeg, and forested scrub-shrub evergreen/muskeg.

Estuarine System

Estuarine areas on the Forest are those areas that are predominantly intertidal, and are those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea, where the sea-water is diluted with freshwater derived from land drainage. Since the Forest Service is not chartered to manage ocean areas, the Forest's wetland inventory data does not cover the areas below mean-high high tide. Estuarine wetlands comprise about one percent of the Forest's mapped wetland acres.

Riverine System

Riverine system includes all streams and rivers contained within channels. This class includes all the perennial streams and rivers in the Forest and includes an estimated 42,429 miles. These areas are bounded on the landward side by an upland, by the channel bank, or by wetland dominated by trees, shrubs,

emergent mosses or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

Lacustrine System

The Lacustrine system includes all permanently flooded lakes on the Forest, reservoirs, and tidal lakes with ocean-derived salinities below 0.5 parts per thousands. Lacustrine wetlands systems include six percent of the total mapped wetland acres.

Riverine System and Riparian Relationship

Riverine system wetlands include the aquatic ecosystems of riparian areas, resulting in an overlapping of management requirements for the same areas (see the following riparian area section). This is in many cases also true for the riparian ecosystems that border the side of streams. These transition areas along streams have soils, vegetation and hydrology characteristics that meet wetland criteria. There are two distinct situations that occur for wetland riparian areas. When in association with uplands there is usually a distinction between where the upland ends and the riparian ecosystems start and border the streams. The width of the riparian ecosystem in this case may be very narrow (15 feet or less) due to the stream's steep, incised side slopes. When wetlands abut riparian ecosystem areas next to streams, the wetland can overlap and include the riparian ecosystem, since the hydrologic influence of the wetland may have more influence on the riparian ecosystem area than the hydrologic influence of the stream.

RIPARIAN AREAS

In general riparian areas include riparian and aquatic ecosystems, and wetlands. Aquatic ecosystems consist of the water habitats of rivers, streams and lakes, and the plants and animals which live within the streams. Riparian ecosystems are the transition areas between the aquatic (water) ecosystems and the adjacent upland (terrestrial) ecosystems. Riparian areas have soil characteristics and/or distinctive vegetative characteristics whose presence is directly influenced by water (an aquatic ecosystem).

Riparian areas are extremely important to fish, wildlife, the timber resource, and recreation. They may also be locations where roads are easily built. Given the continual moist conditions of the Tongass, riparian ecosystems which are influenced by water tables have better-defined riparian area habitat zones than those influenced by surface water. Riparian ecosystems have a more diverse and unique plant composition than upland areas. This appears to be a function of soil factors combined with microclimatic restraints, such as a lack of light or low temperature (Alaback and Sidle 1986). Riparian areas are important sources of ecosystem diversity. Since riparian areas are valuable producers of many resources, conflict is common in these areas used for timber production, fish and wildlife habitat, and recreation.

Streamside and Lakeside Riparian Areas

These extremely dynamic systems are best described by their aquatic ecosystems. The aquatic ecosystems of rivers and streams are located in or near stream channels, whereas the water habitats of lakes are contained in topographic depressions. For the purposes of this discussion, a channel is defined as "an open conduit either naturally or artificially created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Rechard and McQuisten, 1968).

Stream classification systems group all streams, rivers, and lakes into two broad groups: confined and unconfined (Marion et al., 1987). Confined channels are usually found on mountainslopes and hillslopes, unconfined channels are found on dissected footslopes, floodplains, alluvial fans, and lakes in depressional areas.

Confined Channels

The riparian ecosystems of confined stream channels are often narrow strips of poorly drained soil and associated vegetation. Alaback and Sidle (1986) found that plants in the riparian ecosystem of this channel type to be considerably more diverse than plants in adjacent uplands, and that most of the species adapted to the riparian ecosystem occurred on wet soils within 15 feet or less on both sides of the stream channel. These riparian ecosystems indicate hydric conditions. Hydric conditions occur when a water table is high enough that the upper part of the soils are virtually free of dissolved oxygen for a duration long enough to develop anaerobic conditions. Vegetation in these areas is generally a mosaic of many different coniferous forest-shrub-forb-dominated plant communities. It is not unusual for the riparian ecosystem to be part of an extensive wetland habitat, especially a forested one.

High gradient contained stream channels (see Appendix J) often lack riparian areas, because of the channel shape and surrounding topography.

Upland soils and plant communities influence the productivity of the confined stream aquatic ecosystems more than they are influenced by them. Where the stream does influence adjacent vegetation and soils, this influence only extends to a narrow strip along the stream channel. The trees and shrubs of the terrestrial ecosystem provide overhanging, tall shade cover for the aquatic ecosystem and provide year-long input of organic debris. Channel areas become important nutrient collection zones, although due to their high velocity only a limited amount of nutrient processing occurs in them.

Unconfined Channels

Unconfined stream channels do not contain flood flows within their banks. Usually located on alluvial fans or dissected footslopes of mountain and valley floodplains, their riparian areas are frequently discontinuous and often interspersed with upland ecosystems. Riparian areas may be flooded by overbank flow (two-year floods or greater). Depending upon streambank and channel stability, these stream channels often migrate or are abandoned, resulting in

oxbows, sloughs, backwater overflow channels, and swales. These areas are classified as wetlands.

Riparian vegetation communities on Southeast Alaska's islands are dominated by a widely-spaced overstory of Sitka spruce and western hemlock with understories of devil's club, salmonberry, currant, and alder. Mixed stands of Sitka spruce and red alder are common on elevated sites not subject to flooding, sites that do not have a high subsurface water table, and at the mouths of larger stream systems.

Riparian ecosystems, such as those along the large mainland glacial rivers and on the broad glacial outwash plains at Yakutat, may contain hardwood trees, such as cottonwood, or mixed stands of coniferous and hardwoods trees. Shrub-dominated plant communities of alder, salmonberry, currant and/or devil's club occur in narrow bands or in larger patches in the more active alluvial sites.

The interaction of riparian areas of unconfined streams and adjacent landforms goes both ways. Mass transfer of nutrients and organisms occurs through bank erosion, channel migration and overflow, leaf fall, and blowdown or tree fall. Unconfined streams are important nutrient sources and processing zones, and they generally contain a richer diversity of organisms than confined channels. Hardwoods provide nitrogen-rich inputs for short, concentrated periods in the spring and during leaf fall in the autumn. Coniferous vegetation provides year-long input of organic debris, which helps maintain the aquatic insect community throughout the year. Some unconfined streams and rivers may be so broad that the adjacent upland ecosystems do not directly influence their riparian areas.

Riparian Habitats

Where not manipulated through timber harvest or other land management activities, the existing old growth and other riparian area habitat types on the Forest are at or near climax condition. Table 3-140 displays acres of riparian areas associated with stream classes on the Forest. (The acres are derived from both inventory data, and from information in the Revision Database. These acres do not include all riparian areas on the Forest; about eighty percent of the wilderness areas do not have sufficient inventory data to generate reliable riparian information.)

In 1954, it is estimated that 49 percent of the riparian areas on the Forest were in old-growth forests. From 1954 through 1988, eleven percent of the old-growth riparian area timber was harvested. The distribution of old-growth harvested in riparian areas is shown in relation to stream classes in Table 3-140. Harvested riparian old growth represents five percent of total riparian areas. This table also displays the acres and percentages of the remaining old-growth riparian

areas by stream class in acres currently managed for timber, and other riparian area information.

Table 3-141 shows the distribution of the riparian and old-growth riparian between the three management areas of the Forest. The Chatham Area has nearly half of the Forest's total riparian acres and acres in old-growth riparian. The Ketchikan has the greatest percentage of its riparian in old growth (66 percent), with Stikine Area having 56 percent, and Chatham Area with 41 percent. While all Areas have had riparian areas harvested since 1954, each still has at least 86 percent of old-growth riparian areas in natural climax conditions. Better than 90 percent of all riparian areas are in natural climax conditions Forest-wide.

Riparian ecosystems harvested for timber are now in various states of relatively rapid secondary plant succession. Except where highly disturbed, the stand composition on these secondary successional riparian areas is very similar to the original riparian area vegetation. The more highly disturbed the site was, the more the secondary succession will replicate the original primary succession.

Secondary successional riparian ecosystems may or may not provide all the riparian area wildlife and vegetative species that existed before timber harvest and road construction. They do, however, supply changing habitat types and species composition. If natural successional processes are allowed to continue over time without additional disturbance, these secondary successional riparian ecosystems will eventually return to their original ecosystem stage. The only condition where this will not occur is where roads have been constructed.

WATER USE

Key water uses on the Forest include domestic water supply, recreation, growth and propagation of fish, and hydroelectric power generation. The Forest supplies domestic water for 18 permanent communities. Ketchikan, Sitka and Petersburg have Congressionally designated municipal watersheds. In addition, water is supplied from the Forest to nine fish hatcheries, three industrial sites, nine logging camps, and three resorts.

Hydroelectric generation continues to be used in many places throughout the Forest to provide electricity for mining, sawmills, pulpmills, communities and other uses. There are six major power installations on the Forest. These installations are the Snettisham, south of Juneau; Beaver Falls, Ketchikan Lakes and Swan Lake east of Ketchikan; and Blue and Green Lakes north and east of Sitka. Additional installations and interties between installations are proposed.

TABLE 3-140
STREAM CLASSES AND RIPARIAN ACRES STATUS[1]

Category	Total Riparian Acres	%	Old Growth Riparian 1954 Acres	Old Growth Riparian 1954 % of Total Riparian	Harvested Old Growth Riparian Acres 1954–1988 Acres	Harvested % of Old Growth Riparian 1954 Categories	Harvested % of Total Old Growth Riparian	Harvested % of Total Riparian	Unharvested Old Growth Riparian 1988 Acres	Unharvested % of Total Old Growth Riparian 1954	Unharvested % of Total Riparian	Remaining Riparian 1988 Acres	Remaining Riparian 1988 % of Total Riparian
Class I													
Buffered[2]	30,266	27	154,877	14	14,524	9	3	1	140,352	91	13	285,742	26
Soils[3]	195,808	18	102,518	9	21,517	21	4	2	81,001	79	7	174,291	16
Class II, III													
Buffered	463,367	43	221,520	20	12,845	6	2	2	208,765	94	19	450,522	41
Soils	130,417	12	69,249	6	9,737	14	1	1	59,512	86	6	120,680	12
Totals	1,089,858	100	548,164	49	58,623	11	9	5	489,540	89	45	1,031,235	95

[1] Stream classes and riparian acres status are for non-wilderness land.

[2] Computer generated area that is established by buffering channels and riparian areas with a minimum of 100 feet.

[3] These are riparian areas along streams that are established through the soil, plant association and landform resource inventories. These areas include small side and feeder streams to the main stream channels. Normally are streams associated with the Low Gradient Floodplain, Alluvial Fan and Estuarine Stream Process Groups.

TABLE 3-141
RIPARIAN STATUS ON THE THREE FOREST AREAS [1]

	Total Riparian		*Old Growth Riparian 1954*		*Harvested Old Growth Riparian Acres 1954-1988*			*Unharvested Old Growth Riparian 1988*			*Remaining Riparian 1988*	
Forest Areas	Acres	%	Acres	% Of Total Riparian	Acres	% Of Old Growth Riparian 1954 Categories	% Of Total Old Growth Riparian	Acres	% Of Total Old Growth Riparian	% Of Total Riparian	Acres	% Total Riparian
Chatham	496,201	100	202,883	41	26,816	14	5	176,067	89	36	496,385	95
Ketchikan	263,044	100	170,547	66	20,428	12	8	150,119	88	58	242,616	92
Stikine	266,907	100	149,120	56	11,344	8	4	137,776	92	52	255,563	96

[1] Riparian acres are for non-wilderness areas.
[2] Total riparian includes buffered, minimum of 100 feet used for analysis, and riparian areas established from soil map units.

WATER

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Forest management activities may affect water quality and quantity, and timing of water flows, through alteration of soil and watershed conditions.

Most watersheds are in a state of dynamic equilibrium where changes occur naturally due to changes in weather patterns. Because of the overriding influence of climate, and basin resiliency, changes in streamflow and sediment delivery resulting from management activities (such as timber harvest) are difficult to measure.

Stream Flow

Watersheds in Southeast Alaska, compared to watersheds in other areas of the United States, return to previous flows and water yields rapidly after logging, as long as an excessive amount of the total drainage area is not harvested at one time. Bartos (1989) evaluated changes in U.S.G.S. stream guage discharge data (1965 to 1981) for the Staney Creek drainage in relation to timber harvest through use of a water yield model. The analysis for the Staney Creek Watershed indicated that there were more acre feet of water being discharged beginning in 1972. Timber harvest records indicated that the 1972 water year followed a year of substantial timber harvesting (2,010 acres or 3.14 square miles). Substantial harvesting activity had occurred prior to 1972 (3,841 acres or 6.08 square miles) with no observable changes in yield, probably because the earlier harvest occurred over a larger area over a five-year period. A flow duration analysis was completed using daily discharge for each year over the period of record, to determine if the flow regime was influenced by the harvesting in the Staney Creek Watershed. This analysis indicated a significant increase in the low flow discharges after 35 percent of the drainage had tress removed.

Whether the same response is occurring due to clearcutting in the northern half of the Forest, which generally has coarser-textured soils and steeper mountain terrain, has not been determined. Due to the higher significance of alpine areas as water storage and release areas, stream flow on the northern part of the Forest probably is less affected by timber harvesting.

EFFECTS OF ALTERNATIVES

An increase in mean and low flows can be considered a benefit during the low precipitation periods that occur in the summer and early fall. However, the potential for changes in mean and low flows for any geozone is extremely low. As shown in Table 3-142, the acreage of available suitable timber in any alternative is small in comparison to the total non-wilderness acres. In addition, the proposed acreage for timber harvest in each alternative is also small. Geozones are large

in size, and their total overall flow characteristics overshadow any increases or decreases that may occur from proposed timber harvest.

MITIGATION

The actual effect on the amount of stream flows from watersheds will be minimized by using Forest-wide standards and guidelines. Timber harvest will be limited to no more than 35 percent of third and fourth order watersheds within a 15-year period or to some level as determined by a cumulative watershed effects analysis. The actual effects from changes in stream flows can only be determined during project planning.

TABLE 3-142
AVAILABLE SUITABLE TIMBER ACRES AND PERCENT OF PROPOSED ACRES OF SUITABLE TIMBER HARVEST BY ALTERNATIVES

Alternatives	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Total Acres of Non-wilderness	14,706,549	14,706,549	14,706,549	14,706,549	14,706,549	14,706,549	14,706,549
Total Acres of Available Suitable Timber/Alt.	1,297,606	1,519,697	2,334,382	2,264,494	1,946,333	2,134,277	2,192,828
Percent of Total Acres as Available Suitable Timber Acres	8.8	10.3	15.9	15.4	13.2	14.5	14.9
Proposed Annual Acres of Timber Harvest	6,000	12,200	15,400	18,500	9,200	13,400	13,400
Percent of Available Suitable Acres	0.05	0.08	0.10	0.12	0.06	0.09	0.09
Proposed Acres of Timber Harvest in First Decade	60,000	122,000	154,000	185,000	92,000	134,000	134,000
Percent of Available Suitable Acres	4.6	8.2	6.7	8.2	4.7	6.3	6.1

Sedimentation

Because of the lack of quantifiable sediment data and the programmatic nature of the Forest Plan, an overall estimate of "disturbed acres" will be used to estimate effects and compare alternatives. This will be related as (1) acres of predicted timber harvest, and (2) acres of predicted new road construction, including road rights-of-way clearing. Although this is not a quantified estimate of sediment yield, it can indicate the relative potential of effects by alternative, and be used as a measure of relative risk of sediment production.

EFFECTS OF ALTERNATIVES

Table 3-143 shows the average annual acres of harvest, individually for decades 1 and 2, and for decades 1-5 and 6-10. At the end of the first decade Alternatives A and E have the lowest potential to cause adverse effects, with 5,970 and 9,250 acres respectively. Alternatives B, F and G will have a higher potential, with 12,170, 13,370 and 13,420 acres respectively. Alternatives D and C have the greatest potential, with 18,540 and 15,350 acres, respectively. These annual average harvest rates for each alternative would continue at about the same level throughout the next 10 decades.

TABLE 3-143
AVERAGE ANNUAL ACRES OF TIMBER HARVEST

Alt.	*Unit of Measure*	*Average 1*	*Annual 2*	*Schedule 1-5*	*By Decades 6-10*
A	Acres	5,970	5,180	5,480	5,180
B	Acres	12,170	11,670	13,260	12,090
C	Acres	15,350	13,730	14,180	13,300
D	Acres	18,540	15,650	15,110	15,830
E	Acres	9,250	8,620	8,950	7,940
F	Acres	13,370	12,570	13,310	12,030
G	Acres	13,420	12,580	12,660	9,920

Source. TLMP Revision FORPLAN Reports 3/90

The total cumulative acres of roads by geozones by alternative for the first and fifteenth decades is given in Table 3-144. This table also lists the total land acres and net vegetated land acres by geozone.

The total cumulative road acres subject to risk of sediment production as of 1988 was 20,366 acres, or 0.17 percent of the net vegetated land and 0.14 percent of the total land in the geozones. In the following general analysis only net vegetated land will be considered. These vegetated areas are where roading will normally occur to meet timber harvest and other management activities for each alternative. Net vegetative land includes forest land, non-productive forest land, young forest and non-stocked forest sites, some alder and brush areas and muskegs. In the first decade, potential sources of erosion-caused sediment ranged from a low of 25,394 acres (0.21 percent) of net vegetated land in Alternative A to a high of 39,842 acres (0.33 percent) in Alternative D. The acres of road disturbance are 1.57 times greater in Alternative D than in Alternative A for the first decade. The other alternatives, ranked in order of increases above

Alternative A, are E (28,703 acres), F (33,868 acres), G (33,928 acres), B (35,055 acres) and C (35,729 acres).

By the fifteenth decade, land subject to erosion-caused sediment (cumulative roaded acres) would range from a low of 36,395 acres (0.30 percent) in Alternative A to a high of 81,458 acres (0.68 percent) in Alternative D. Acres of road disturbance is estimated to be 2.24 time greater in Alternative D than in Alternative A for the fifteen decades. The other alternatives follow in roughly the same order as above.

A road density of three percent per square mile (19 acres) is considered to be a significant density of roads with cable logging systems like those used on the Tongass. Three percent of the total net vegetated land (11,965,254 acres) is 358,958 acres. None of the alternatives, even after 15 decades, comes near this threshold. All alternatives would use less than one percent of the total net vegetated acres for roads.

MITIGATION

Few monitoring investigations have been conducted in Southeast Alaska to measure sediment increases resulting directly from road construction and stream crossing activities. The monitoring investigations discussed in the affected environment demonstrate that Best Management Practices (BMPs) (see Appendix I) have been successful in preventing sedimentation, or in keeping sediment inputs from logging and road construction to levels that are within the range of natural sediment yield. BMPs will continue to be the primary tool used on the Tongass National Forest to mitigate the effects of logging activities on water quality. Some short term degradation of water quality from increased turbidity and suspended particulates is unavoidable, particularly during road construction. Best Management Practices will be applied to management activities to meet all State and Federal water quality standards. BMP's will be planned and implemented at the project level and monitored according to the Forest monitoring plan (Appendix H).

TABLE 3-144
CUMULATIVE ACRES OF ROADS PER GEOZONE BY ALTERNATIVE FOR THE FIRST AND FIFTEENTH DECADE

		Net Vegetated	Alt A		Alt B		Alt C		Alt D		Alt E		Alt F		Alt G	
Geozone[1]	Total Acres	Acres	1	15	1	15	1	15	1	15	1	15	1	15	1	15
C01	176,137	115,678	0	0	27	108	0	0	0	0	0	0	0	0	0	0
C02	354,207	284,649	940	981	1,555	2,736	1,649	3,114	1,555	2,736	961	981	1,865	3,978	1,858	3,951
C04	41,029	32,712	121	141	168	330	209	492	182	384	128	141	209	492	209	492
C05	120,013	99,728	0	0	14	54	7	27	14	54	0	0	14	54	7	27
C06	372,719	296,168	790	817	1,451	3,139	1,134	1,924	1,303	2,599	790	817	1,161	1,978	1,168	2,032
C09	294,733	175,069	370	370	579	748	572	721	579	748	370	370	572	721	572	721
C10	431,918	321,666	568	568	1,297	1,756	1,216	1,432	1,216	1,432	568	568	1,216	1,432	1,216	1,432
C11	126,120	89,731	124	124	124	124	124	124	158	259	124	124	124	124	124	124
C18	217,530	136,552	233	273	523	1,434	267	408	429	1,056	219	219	348	732	348	732
C20	86,742	78,354	34	135	74	297	196	783	122	486	95	378	182	729	122	486
C21	182,721	124,841	15	35	298	1,169	103	386	116	440	8	8	103	386	96	359
C22	719,339	483,668	114	114	114	114	195	438	256	681	114	114	128	168	114	114
C23	1,970,942	785,554	0	0	263	1,053	0	0	27	108	0	0	0	0	0	0
C24	159,485	150,663	389	510	504	969	470	834	524	1,050	456	780	470	834	470	834
C25	240,716	220,876	53	87	431	1,707	722	2,868	431	1,707	53	87	580	2,301	695	2,760
K01	130,025	49,390	207	207	207	207	335	720	261	423	335	720	335	720	335	720
K04	491,445	453,464	1,907	1,907	3,750	9,278	1,907	1,907	2,447	4,067	1,907	1,907	1,907	1,907	1,907	1,907
K05	193,473	188,716	0	0	520	2,079	203	810	297	1,188	0	0	317	1,269	182	729
K06	709,615	673,594	7,410	10,940	8,234	13,640	8,247	13,856	9,098	15,908	7,741	12,938	8,045	13,910	7,991	13,613
K07	279,242	253,645	695	1,478	1,337	2,828	1,593	3,341	1,735	3,746	1,553	3,179	1,296	3,341	1,505	3,341
K08	399,683	355,481	1,704	2,507	2,655	4,289	2,885	5,639	2,480	4,964	2,365	3,992	3,114	5,342	2,959	5,342
K09	141,794	132,552	99	261	605	2,286	572	2,151	605	2,286	99	261	572	2,151	572	2,151
K10	102,921	100,460	0	0	135	378	419	1,431	311	999	7	0	68	243	47	162
K11	224,209	214,520	3,200	4,557	3,349	5,151	3,673	6,447	3,679	6,474	3,423	5,448	3,423	5,448	3,605	6,177
K13	151,185	151,185	85	85	85	85	85	85	85	85	85	85	85	85	85	85
S01	302,218	290,135	1,590	3,189	2,001	3,675	2,089	4,674	2,447	6,132	1,630	3,351	1,961	4,161	1,968	4,188
S02	124,065	119,588	0	0	135	486	452	1,107	689	1,998	0	0	405	918	405	918

[1]Geozones C03, C07, C11, C12, C13, C14, C15, C16, C17, K02, K12, K13, K14, K15, S10, S12, and S14.
Geozone K13 only accounts for the 151,185 acre roaded non-wilderness area of Misty Fiords Monument.

TABLE 3-144 (continued)
CUMULATIVE ACRES OF ROADS PER GEOZONE BY ALTERNATIVE FOR THE FIRST AND FIFTEENTH DECADE

		Net Vegetated	*Alt A*		*Alt B*		*Alt C*		*Alt D*		*Alt E*		*Alt F*		*Alt G*	
Geozone[1]	*Total Acres*	*Acres*	*1*	*15*	*1*	*15*	*1*	*15*	*1*	*15*	*1*	*15*	*1*	*15*	*1*	*15*
S03	314,024	308,351	886	1,008	880	981	1,102	1,872	1,669	4,140	880	981	880	981	880	981
S04	115,283	111,820	1,197	1,588	1,042	1,669	1,237	1,912	1,507	2,533	1,069	1,669	954	1,318	954	1,318
S05	117,584	116,185	1,037	1,489	1,017	1,489	1,050	1,543	1,071	1,597	1,050	1,543	1,050	1,543	1,050	1,543
S06	235,054	216,287	402	747	375	801	1,023	1,908	1,300	3,150	929	1,530	740	1,530	740	1,530
S07	119,543	115,883	544	828	531	774	591	1,017	834	1,989	470	531	470	531	470	531
S08	611,468	223,486	340	711	333	900	549	1,764	1,008	2,142	529	1,683	529	1,683	529	1,683
S09	764,566	463,583	142	432	115	459	466	1,863	790	2,160	547	1,647	412	1,647	412	1,647
S10	287,266	282,559	0	0	0	0	47	189	324	1,296	0	0	0	0	0	0
S14	44,043	42,559	198	306	327	468	340	495	293	441	198	306	333	441	333	441
TOTALS	14,857,734	11,945,264	25,394	36,395	35,055	67,661	35,729	68,282	39,842	81,458	28,703	46,358	33,868	63,098	33,928	63,071

[1]Geozones C03, C07, C11, C12, C13, C14, C15, C16, C17, K02, K12, K13, K14, K15, S10, S12, and S14.
Geozone K13 only accounts for the 151,185 acre roaded non-wilderness area of Misty Fiords Monument.

Temperature

Most Southeast Alaska streams are not highly sensitive to temperature changes. Frequent cloudiness, low air temperatures, steep channel gradients, and frequent precipitation tend to keep stream temperatures below the levels considered harmful to fish. However, stream temperatures may be increased if long strips of shade-producing vegetation are removed from along south, southwest, west, and northwest banks of temperature- sensitive streams. The streams most likely to be temperature sensitive usually contain lakes, muskegs and organically-stained water. Many have low channel gradients, and southeast to southwest exposures.

EFFECTS AND MITIGATION

Increased projected timber harvesting in the roaded geozones should not significantly increase water temperature under any of the alternatives. Water temperature should be maintained at present levels in timber harvest areas. Appropriate stream buffer strips will provide necessary shade along Class I and II streams due to the application of the Stream and Lake Protection prescription.

There will be more Class III streams harvested to the bank in the alternatives that have higher projected harvest acres. However, water flow in Class III streams is fast, allowing the water less time to heat up, the streams receive less radiation, and the water is assimilated into larger bodies of water. Thus, no significant increase in temperature is anticipated. There is a potential of storm blowdown of buffers developed through application of the Stream and Lake Protection Prescription. The potential is greater in areas with higher harvest levels. The effect of blowdown on water temperature in Southeast Alaska is not known.

Dissolved Oxygen

The streams in Southeast are moderate to high gradient streams with turbulent flows. Abundant precipitation and turbulent flow causes the streams to be oxygen rich. Biochemical Oxygen Demand (BOD) is a product of decomposition of fine organic material and excess amount of fish during a period of little to no replenishing of the watershed water supply. Most Southeast Alaska streams are not considered highly sensitive to dissolved oxygen depletion from timber harvesting activities. High dissolved oxygen concentrations are maintained by the same natural characteristics that keep stream temperature low. However, dissolved oxygen levels and biochemical oxygen demand may be affected if logging slash is allowed to accumulate in streams.

EFFECTS AND MITIGATION

With use of the Stream and Lake Protection prescription, timber harvest will not directly affect dissolved oxygen. Harvest may occur only along limited portions of any stream (e.g., yarding corridors and road stream crossings). BMP's and timber sale contract clauses require accumulations of logging slash to be cleaned from streams at these locations. BOD conditions in streams could be affected indirectly by significant blowdown of the stream buffer into the stream. Harvest adjacent to stream buffers can make them more vulnerable to blowdown, as the buffer vegetation becomes more dependent on its own windfirmness rather

than having an adjacent block of timber for additional protection. Alternatives A and E have more acres of existing timber remaining to protect buffer vegetation than Alternatives B, C, D, F or G.

Wetlands

There are 3,248,759 acres of lake and land-type wetlands andan estimated 42,429 miles of riverine wetlands presently inventoried. (Review Table 3-139 for types of wetlands.) These wetland acres and miles include some wildernesses that have been inventoried on the Stikine Area. There are 654,847 acres of land wetlands in existing and proposed roaded areas under the alternatives. These acres constitute 20 percent of the total land wetland acreage on the Forest.

The large acreage and general distribution of wetlands throughout the Southeast Alaska landscape makes it impossible to avoid construction on wetlands if resource management activities are to occur. The chemical, physical and biological integrity of wetlands as waters of the United States will be affected mainly through timber harvest operations which includes construction and maintenance of roads, landings and stream crossing structures. Silviculture operations such as cultivating and harvesting trees are exempted from U.S. Army Corps of Engineers 404 Permit requirements (33 CFR 323.4). The construction or maintenance of permanent or temporary roads in support of silvicultural practices and temporary roads for moving mining equipment are also covered under this exemption for the discharge of dredged or fill material into non-navigable waters of the United States. This exemption is contingent on the construction and maintenance being conducted in accordance with BMP's described in the State's approved program (see Appendix I) pursuant to the requirements of 40 CFR Part 233.33(i), and the baseline provisions as outlined in 33 CFR 323.4 [6] (i) thru (xv).

As required by law, the Forest will obtain general or standard permits from the Corp of Engineers (COE) for the discharge of dredged or fill material into waters and wetlands for any activity not exempted. Certain discharges specified in 33 CFR Part 330 are permitted by that regulation ("nationwide permits"). Some of the activities allowed under this regulation that the Forest may become involved in include: (1) fish and wildlife harvesting devices and activities; (2) staff gages, tide gages, water recording devices, water quality testing and improvement devices, and similar scientific structures; (3) bank stabilization activities with provisions listed; (4) minor temporary and permanent road crossing fills including all attendant features with described provisions; and (5) discharges of dredged or fill material incidental to the construction of bridges across navigable waters including attendant features. The special conditions listed in 330(b) must be met for the nationwide permits to be valid. Other discharges may be authorized by district or division engineers on a regional basis ("regional permits").

EFFECTS OF ALTERNATIVES

Table 3-145 shows the projected acres of wetlands within roaded and proposed roaded areas, acres of silvicultural roads on wetland as of 1988, and projected silvicultural roads for each alternative for the first and fifteenth decade. All estimated road acres are for roaded and proposed roaded areas as directed by the theme of each alternative. The following is a general overview of the effects of alternatives for the Forest.

Total wetland loss in roaded geozones, as of 1988, due to past construction of roads, landings, and associated drainage structures in association with silvicultural practices is 1,880 acres or 0.29 percent of the present roaded areas. This 1,880 acre loss of wetlands equals 0.06 percent of the total inventoried wetland acres on the Forest. In the first decade, removal of wetlands from production due to the cumulative road acres is estimated to be from 2,260 acres (0.35 percent) in Alternative A to 3,546 (0.54 percent) in Alternative D. There is a difference of 0.19 percent in the percent of acres of wetlands affected between alternatives in the first decade. The other alternatives range in percent as follows: E (0.39 percent), F and G (0.46 percent), and B and C (0.48 percent). Even though there are increases in wetland losses between alternatives, the maximum wetland losses over the first decade is estimated to be 0.54 percent of the 20 percent of the wetlands in the roaded and proposed roaded areas.

In the fifteenth decade, removal of wetlands from production due to cumulative road acres in roaded and proposed roaded areas could range from 3,239 acres (0.50 percent) in Alternative A to 7,250 acres (1.10 percent) in Alternative D. The other alternatives range as follows: E (0.63 percent), F and G (0.86 percent), and B and C (0.92 percent). The maximum wetland losses over 150 years would be about 1.1 percent of the 20 percent of the wetlands in the roaded and proposed roaded areas.

MITIGATION

Even though normal silviculture practices, including timber harvest and supporting road construction and maintenance, are exempted from COE 404 permit system for dredged and fill materials, the forest will continue to use Best Management Practices in all management activities which could affect water quality within wetlands.

Riparian Areas

Riparian areas, as a component of aquatic and riparian ecosystems, will be protected through use of the Stream and Lake Protection prescription where there is high risk of adverse effects from a management activity. Presently 95 percent of all riparian areas (Table 3-140) are in a natural condition, with eleven percent of the riparian commercial growth having been harvested.

EFFECTS AND MITIGATION

The use of the Stream and Lake Protection prescription will minimize the effects of management activities on riparian areas. The potential effects of blowdown would be as previously discussed. Alternatives A and E have more acres of existing timber remaining to protect riparian vegetation, while alternatives B, C, D, F and G will remove more timber from geozones and provide less protection.

The application of Best Management Practices (BMPs) will minimize or prevent adverse effects on water quality from the limited areas of timber harvest yarding corridors and road stream crossings. BMPs will also be applied to Class I and II streams where selective or single-tree harvest is allowed. Water quality Class III streams would be provided with variable treatment with application of the Stream and Lake Protection management prescription. Some Class III streams would have narrow no harvest buffers, however most would be considered for clearcut harvest to the streambank. Forest-wide, Alternative A would provide the least risk to water quality, followed by Alternatives E, B, C, F, G and D.

TABLE 3-145
PROJECTED ACRES OF ROADS ON WETLANDS—BY ALTERNATIVE FOR DECADES 1 AND 15

Geozone[1]	Acres	Acres as of 1988	Alt A 1	Alt A 15	Alt B 1	Alt B 15	Alt C 1	Alt C 15	Alt D 1	Alt D 15	Alt E 1	Alt E 15	Alt F 1	Alt F 15	Alt G 1	Alt G 15
C01	238	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0
C02	11,845	82	84	87	138	244	147	277	138	244	86	87	166	354	165	352
C04	1,678	10	11	13	15	29	19	44	16	34	11	13	19	44	19	44
C05	1,145	0	0	0	1	5	1	2	1	5	0	0	1	5	1	2
C06	11,917	68	70	73	129	279	101	171	116	231	70	73	103	176	104	181
C09	5,074	33	33	33	52	67	51	64	52	67	33	33	51	64	51	64
C10	10,400	50	51	51	115	156	108	127	108	127	51	51	108	127	108	127
C11	17,328	11	11	11	11	11	11	11	14	23	11	11	11	11	11	11
C18	2,136	20	21	24	47	128	24	36	38	94	19	19	31	65	31	65
C20	173	0	3	12	7	26	17	70	11	43	8	34	16	65	11	43
C21	254	1	1	3	27	104	9	34	10	39	1	1	9	34	9	32
C22	82	10	10	10	10	10	17	39	23	61	10	10	11	15	10	10
C23	561	0	0	0	23	94	0	0	2	10	0	0	0	0	0	0
C24	1,592	31	35	45	45	86	42	74	47	93	41	69	42	74	42	74
C25	51	1	5	8	38	152	64	255	38	152	5	8	52	205	62	246
K01	54	18	18	18	18	18	30	64	23	38	30	64	30	64	30	64
K02	1,838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K04	18,370	170	170	170	334	826	170	170	218	362	170	170	170	170	170	170
K05	88,604	0	0	0	46	185	18	72	26	106	0	0	28	113	16	65
K06	86,723	526	659	974	733	1,214	734	1,233	810	1,416	689	1,151	716	1,238	711	1,212
K07	130,278	2	62	132	119	252	142	297	154	333	138	283	115	297	134	297
K08	14,432	103	152	223	236	382	257	502	221	442	210	355	277	475	263	475
K09	301	104	9	23	54	203	51	191	54	203	9	23	51	191	51	191
K10	34	0	0	0	12	34	37	127	28	89	1	0	6	22	4	14
K11	26,242	244	285	406	298	458	327	574	327	576	305	485	305	485	321	550
K13	15,382	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
S01	16,162	94	142	284	178	327	186	416	218	546	145	298	175	370	175	373
S02	56,637	0	0	0	12	43	40	99	61	178	0	0	36	82	36	82

[1] Geozones C03, C07, C08, C12, C13, C14, C15, C16, C17, C18, C19, K02, K03, K12, S11, S12 and S13 do not have roads at the time and none are proposed.

TABLE 3-145 (continued)
PROJECTED ACRES OF ROADS ON WETLANDS—BY ALTERNATIVE FOR DECADES 1 AND 15

		Acres as	Alt A		Alt B		Alt C		Alt D		Alt E		Alt F		Alt G	
Geozone[1]	Acres	of 1988	1	15	1	15	1	15	1	15	1	15	1	15	1	15
S03	34,816	75	79	90	78	87	98	167	149	368	78	87	78	87	78	87
S04	24,538	74	107	141	93	149	110	170	134	225	95	149	85	117	85	117
S05	34,327	63	92	133	91	133	93	137	95	142	93	137	93	137	93	137
S06	6,927	21	36	66	33	71	91	170	116	280	83	136	66	136	66	136
S07	12,607	40	48	74	47	69	53	91	74	177	42	47	42	47	42	47
S08	4,227	13	30	63	30	80	49	157	90	191	47	150	47	150	47	150
S09	4,226	0	13	38	10	41	41	166	70	192	49	147	37	147	37	147
S10	10,604	0	0	0	0	0	4	17	29	115	0	0	0	0	0	0
S14	3,044	8	18	27	29	42	30	44	26	39	18	27	30	39	30	39
TOTAL	654,847	1,880	2,260	3,239	3,120	6,022	3,180	6,077	3,546	7,250	2,555	4,126	3,014	5,616	3,020	5,613

Source: FORPLAN generated road miles and GIS queries.

[1]Geozones C03, C07, C08, C12, C13, C14, C15, C16, C17, C18, C19, K02, K03, K12, S11, S12 and S13 do not have roads at the time and none are proposed.

WILD AND SCENIC RIVERS

AFFECTED ENVIRONMENT

INTRODUCTION

This section describes the process for identifying rivers that are eligible for inclusion in the National Wild and Scenic Rivers System, describes the issues and concerns surrounding designation, and provides an inventory of the outstandingly remarkable values and potential classification of tentatively eligible rivers. It concludes with discussion of the effects of alternatives on the tentatively eligible rivers. A listing and discussion of individual rivers is found in Appendix E.

The Wild and Scenic Rivers Act of 1968 provides a means for recognizing and protecting the outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecologic and other values of selected rivers. The intent of including a river in the National Wild and Scenic Rivers System is to preserve the free-flowing condition of the river itself, as well as the characteristics of the river's immediate environment, for the enjoyment and benefit of present and future generations.

The process for adding rivers to the National system includes four steps. First, there is a determination of eligibility; to be *eligible* the river must be free-flowing and must have at least one outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or ecologic value. This value should be a unique or exceptional representation for the area studied. In the evaluation for the Tongass National Forest, seven geographic provinces representing different geologic, climatic and ecologic conditions were used.

Second, the river or its segments are *classified* according to the criteria in the Wild and Scenic Rivers Act.

> A river is defined in the Wild and Scenic Rivers Act as "a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, kills, rills, and small lakes". By inference, a glacier could be considered a flowing body of water (ice), although this interpretation is untested.
>
> *Wild river areas* are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive in character and waters unpolluted. These represent vestiges of primitive America. In Alaska, traditional access by aircraft, powerboat and other means of surface transportation is considered compatible with Wild River areas.

Scenic river areas are defined as those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational river areas are defined as those rivers or sections of rivers that are readily accessible by road or railroad, that may have undergone some development along their shorelines and that may have undergone some impoundment or diversion in the past.

The third step is the determination that a river is *suitable* for inclusion in the National system. Suitability refers to how designation of a river fits the overall management for the area, and considers the trade-offs with other resource values. Mixed ownership, State and local government interests and the value of other resources and potential uses, among other reasons, may affect the decision to recommend a river as suitable. In this DEIS the presentation of tentatively eligible rivers in alternatives is intended to display a range of potential recommendations of rivers which would be "suitable" given the allocation of adjacent lands to compatible management area prescriptions, and to generally display the effects that could result from designation. Final determination of eligibility, suitability, and recommendation of specific rivers may occur in the Final EIS.

Finally, if a river is considered eligible and suitable it may be recommended by the land managing agency for *designation* as a wild, scenic or recreational river. This is a preliminary administrative recommendation; only Congress can make a wild and scenic river designation, as it did for 26 Alaskan rivers in 1980.

CURRENT SITUATION

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) designated 26 rivers in Alaska as components of the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act of 1968. None of these rivers is within the Tongass National Forest. An additional 12 rivers were designated as "study rivers" by ANILCA, of which only one, the Situk River near the community of Yakutat, is within the Tongass National Forest.

The Situk River, including the West Fork and Old Situk Creek, was studied in 1983 and found to possess outstandingly remarkable fish, wildlife and recreational values of national significance, but was not recommended for designation. The State of Alaska, Alaska Department of Fish and Game, and other state and local government organizations supported the development of a management plan for the Situk river rather than designation as a Wild and Scenic River. These findings and the decision not to recommend the Situk are considered to be a part of the current Tongass National Forest Land Management Plan;

therefore, no additional study of the Situk's eligibility and suitability was conducted during the plan revision.

Rivers on the Tongass National Forest were never considered for inclusion in the National Rivers Inventory maintained by the Department of Interior, National Park Service. As a result, no rivers other than the Situk have been evaluated for their potential eligibility for inclusion in the National Wild and Scenic River System.

There are nearly 900 watersheds on the Tongass National Forest, containing some 42,500 miles of perennial stream. Some 2,000 individual streams and tributaries totaling 12,000 miles support anadromous fisheries. Of these about 100, the major salmon streams, are responsible for production of more than half of the salmon in Southeast Alaska. The Alaska Department of Fish and Game has identified 64 watersheds as "important," and 19 watersheds as "high quality," for their commercial fish production and sport fishing values, and other wildlife and fish related attributes. Several rivers with a variety of important ecologic features have been identified as potential research natural areas (see the "Research Natural Areas" section of this chapter).

Several of the Forest's major rivers originate in British Columbia or the Yukon Territory, and are currently subject to international fishery management agreements. Some of the major rivers have historically been used as travelways into Canada, including steamboat travel, and are identified by the State as having potential as road corridors connecting Southeast Alaska with Canada. A number of rivers also have a record of prehistoric use for travel and subsistence activities. The State of Alaska claims jurisdiction over the water and stream bed of all "navigable" streams and rivers.

The small size of communities, and (with a few exceptions) the lack of industrial development, has meant that water supply and hydroelectric projects are small and widely scattered. There are no large "mainstem" dams in Southeast Alaska. This lack of development, along with generally high scenic quality, and wildlife and fish habitat values, implies that many streams on the Tongass could be considered as possessing outstandingly remarkable values when compared to rivers in the "lower 48" states.

Only a few rivers have road access, and fewer still have access to both upstream and downstream segments. Many have steep gradients, or numerous barriers to travel in the form of fallen trees. As a result, recreation opportunities that are commonly considered important in defining outstanding recreation value, such as the opportunity to float or kayak a river, are found on only a few rivers or river-lake systems at the present time. Powerboat access is common on some rivers. Most public use of rivers occurs near the river's mouths, in bays and

estuaries where saltwater provides access by boat to fishing, hunting and viewing opportunities.

Some rivers on the Tongass may present opportunities to represent ecosystems or features not represented by existing components of the National Wild and Scenic Rivers System. Some rivers contain native runs of anadromous fish that have not been altered through management. Some contain the full diversity of anadromous fish species. A few present unique "fly-in, float out" recreation opportunities. Most are within a temperate coastal rain forest ecosystem and present the only opportunity outside of Washington, Oregon and northern California to represent this ecosystem in the National system. Several represent active glaciers and glacial geology not found elsewhere in the United States. Some offer the opportunity to represent rivers that flow through the entire vertical range of ecosystems, from alpine tundra to the sea, in a distance of only a few miles. A few present opportunities for international river conservation efforts.

ISSUES AND CONCERNS

The Alaska National Interest Lands Conservation Act gives the State of Alaska the option of developing transportation linkages between communities and to areas outside Southeast Alaska. Some would view designation of wild and scenic rivers as limiting these transportation system development options. At the same time, others see the current lack of development as presenting a unique opportunity to identify and protect potentially eligible rivers before they undergo development. Potential road corridors have been identified in a number of locations containing potentially eligible rivers, including the routes from Haines to Juneau, from Wrangell to Canada by way of several river valleys such as the Stikine and Bradfield Rivers, from Juneau to Canada via the Taku River, and from Ketchikan to Wrangell.

Development of water and power resources is also an issue in Southeast Alaska. All the communities of Southeast Alaska are dependent on locally-produced electricity, generated by hydroelectric or diesel generators. There are virtually no options to connect to power grids "outside." Solid fuel generation is impractical due to the lack of rail transportation and the distance to the nearest bulk coal terminal at Seward, 600 miles across the Gulf of Alaska. Natural gas is unavailable and opportunities for pipeline construction are severely limited by the island character of the area, or by icefields and glaciers along the Canadian border. Although hydroelectric projects are presently small and widely scattered, the high flow and gradient of many large rivers presents significant hydroelectric potential. Some would argue that designation of Wild and Scenic rivers could limit future development because non-hydroelectric alternatives are virtually non-existent.

Numerous tentatively eligible rivers are within the long-term sale areas of the Alaska Pulp Corporation on Chichagof, Baranof, Kuiu and associated islands, and the Ketchikan Pulp Company on Prince of Wales and Revillagigedo Islands

and the Cleveland Peninsula. Designation of rivers in these areas could affect some activities of these companies, or increase the cost of logging.

Although provided for in the ANILCA designation of Wild and Scenic Rivers in Alaska, some may view designation of wild and scenic rivers as potentially limiting the development of fisheries enhancement projects such as fish passes. At the same time, protection of key salmon-producing streams by limiting timber harvest and road construction is considered important by many commercial fishermen. Most of the tentatively eligible rivers and streams on the Tongass National Forest support anadromous fisheries and many contribute substantially to the fishing industry.

Many people in Alaska make all or part of their living following a subsistence way of life. While many seek to protect the wildlife habitat and fisheries in important subsistence activity areas, including many eligible river areas, there has historically been little support for additional Congressional land allocations by such persons because they fear that designations such as Wild and Scenic Rivers may attract additional and competing recreation use, or result in additional regulation of activities within the area.

Mineral interests may express concern that designation of wild and scenic rivers would limit the future development of mineral resources important to Alaska's economy. Wild river areas are withdrawn from mineral entry, subject to valid existing rights, 1/4 mile either side of the high water mark of the river. Operating costs for existing mining activities in wild rivers could increase due to requirements to minimize impact on the river values. In scenic and recreational river areas which remain open to mineral entry, operating costs could also increase as operating plans would be designed to reduce effects on visual quality and recreation opportunities. Only a few of the tentatively eligible rivers are within high priority mineralized areas.

Inventory, Eligibility and Classification

An evaluation was conducted for the purpose of determining the tentative eligibility, potential classification and suitability (by alternative) of all streams and rivers on the Tongass National Forest. This process began with an inventory of all areas of the Forest by Forest Service personnel and, as requested, by field personnel of the Alaska Department of Fish and Game and other individuals with knowledge of river resources. The inventory initially included listings of potentially eligible streams compiled from existing information sources, including the Catalogue of Waters Important to Anadramous Fish (maintained by the Alaska Department of Fish and Game, Habitat Division), the current Forest Plan value comparison unit (watershed) ratings for fish, wildlife and recreation, the 1983 Sport Fish Habitat Improvement Program ratings of streams, and inventoried potential Research Natural Areas and other special management areas.

From these information sources, as well as from information provided by Forest Service fish biologists, hydrologists and other professionals personally familiar with river resources, streams and rivers that appeared to have potential outstandingly remarkable values were identified. Streams and rivers with possible outstandingly remarkable values were further evaluated following the processes outlined in Guidelines for Eligibility, Classification and Management of Wild and Scenic Rivers (U.S. Department of the Interior and U.S. Department of Agriculture, 1982) and in Chapter 8 of Forest Service Handbook 1909.12. Potential outstandingly remarkable fish and wildlife, recreation, scenic, geologic, cultural, historic and ecologic values were examined.

This inventory and evaluation was confined to rivers and streams which are primarily on National Forest System lands. A number of other potentially eligible streams are present in Southeast Alaska but are either wholly or substantially on Native and private lands, State lands (such as the Chilkat River), or lands administered primarily by other Federal agencies, such as the Tsirku River, administered by the Department of Interior, Bureau of Land Management, and the Alsek River, most of which is administered by the USDI National Park Service. These were not included in the inventory and evaluation for the Tongass National Forest.

The evaluation resulted in the tentative determination that 112 rivers with a total length of 1,504 miles are eligible for consideration as components of the National Wild and Scenic River System.

The 112 tentatively eligible rivers, their outstandingly remarkable values, and their potential classification are displayed in Table 3-146. Additional information on the characteristics and resources of each of the tentatively eligible rivers is contained in Appendix E.

TABLE 3–146
TONGASS NATIONAL FOREST TENTATIVELY ELIGIBLE RIVERS

River Name	VCU	Wild (Miles)	Scenic (Miles)	Recreation (Miles)	Geographic Province[1]	Outstandingly Remarkable Values						
						Fish	Wildlife	Recreation	Scenic	Historic/ Cultural	Geology	Ecology
Aaron, Oerns, Berg Creeks	503S	37	—	—	CR	X	X	X	X	—	—	—
Alecks Creek and Lake	405S	5	—	—	SI	X	—	X	—	X	—	—
Alpine Creek (local)	495S	3	—	—	CR	—	—	X	X	—	—	—
Anan Creek	522S	18	—	—	II	X	X	X	—	—	—	—
Andrews Creek	493S	17	—	—	CR	X	X	X	X	—	—	—
Antler River	14C	13	—	—	LC	—	—	—	X	—	X	X
Baird Glacier	482S	20	—	—	CR	—	X	X	X	—	—	—
Bakewell Creek-Badger Lake	826K	17	—	—	CR	X	—	X	—	—	—	—
Benzeman River	347C	14	—	—	NOI	X	—	—	X	—	—	—
Berner's River	12C	10	—	—	LC	X	X	X	X	—	X	X
Big Branch tributary	341C	12	—	—	NOI	—	—	—	X	—	—	X
Big Creek	674K	5	—	—	SI	X	X	X	X	—	—	—
Big Goat Creek and Lake	802K	6	—	—	CR	—	X	X	X	—	—	—
Black River	272C	9	—	—	NOI	—	—	X	X	—	—	—
Blind River	451S	—	—	5	II	X	X	X	—	—	—	X
Blossom River	815K	12	13	—	CR	X	—	—	—	—	—	—
Blue River	787K	17	—	—	CR	—	X	—	X	—	X	—
Bradfield River East Fork	517S	—	—	19	CR	X	X	—	X	—	—	—
Bradfield River North Fork	514S	—	—	27	CR	X	X	—	X	—	—	—
Canoe Point stream	625K	3	—	—	SI	—	—	—	X	—	—	—
Cascade Creek	486S	5	—	—	CR	X	—	X	X	—	—	—
Castle River	435S	23	—	—	II	X	X	X	—	—	—	—
Cathedral Falls Creek	425S	—	1	—	II	—	—	X	X	—	—	—
Chickamin River	797K	113	—	—	CR	X	X	X	X	X	—	—
Chuck River	76C	15	—	—	CR	X	—	—	X	X	—	X
Dangerous River	377C	—	23	—	YF	—	X	X	X	—	—	—
Duncan Salt Chuck, Creek	441S	10	—	—	II	X	X	X	X	X	—	—
Eagle River	26C	—	—	6	LC	—	—	X	X	X	X	—
Eagle River and Lake	519S	12	—	—	CR	X	—	X	—	—	—	—
Earl West Creek (local)	478S	—	—	9	II	X	—	X	—	—	—	—

[1] CR—Coast Range, LC—Lynn Canal, NOI—Northern Outer Islands, NII—Northern Interior Islands, II—Interior Islands, SI—Southern Islands, YF—Yakutat Forelands.

TABLE 3-146 (continued)
TONGASS NATIONAL FOREST TENTATIVELY ELIGIBLE RIVERS

						Outstandingly Remarkable Values						
River Name	VCU	Wild (Miles)	Scenic (Miles)	Recreation (Miles)	Geographic Province[1]	Fish	Wildlife	Recreation	Scenic	Historic/ Cultural	Geology	Ecology
Endicott River	66C	21	—	—	LC	—	X	—	X	—	X	—
Essowah Lake and streams	659K	13	—	—	SI	X	X	—	X	—	—	—
Fall Dog Creek (local)	400S	3	—	—	II	X	X	—	—	X	—	—
Falls Creek and McHenry Lake	472S	2	—	—	II	X	—	—	X	—	—	—
Farragut River	90S	30	—	—	CR	X	X	—	X	—	—	—
Fish Creek	806K	—	—	4	CR	X	—	—	—	—	—	—
Fred's Creek	308C	5	—	—	NOI	—	—	—	X	—	X	—
Gambier Bay tributaries	170C	14	—	—	NII	X	—	—	—	—	—	X
Gilkey River	15C	9	—	—	LC	X	—	X	X	—	X	X
Glacial River	314C	10	—	—	NOI	—	—	—	X	—	X	X
Gokachin-Mirror-Low-Fish Cr.	754K	30	—	—	II	X	X	X	X	X	—	—
Granite Creek-Manzoni Lake	800K	8	—	—	CR	—	—	—	X	—	—	—
Hamilton Creek	425S	—	20	—	II	X	—	—	—	—	—	—
Harding River	511S	16	—	—	CR	X	X	X	—	—	—	—
Harris River	610K	—	—	7	SI	—	—	X	—	—	—	—
Hasselborg Creek and Lakes	157C	25	—	—	NII	X	X	X	X	—	—	—
Hatchery Creek and Lake	472S	2	—	—	II	X	—	X	—	—	—	—
Herbert River	26C	—	—	6	LC	—	—	X	X	—	X	—
Hulakon River	786K	7	—	—	CR	X	X	X	X	—	—	—
Humpback Creek and Lake	834K	14	—	—	CR	X	X	—	—	—	—	—
Hunter Bay lakes and streams	694K	22	—	—	SI	X	X	X	X	—	—	—
Irish Creek-Keku Creek	428S	10	7	—	II	X	—	—	—	X	—	—
Johnson Lake and streams	692K	5	—	—	SI	X	X	—	—	—	—	—
Kadake Creek	421S	5	—	18	II	X	X	X	X	X	—	—
Kadashan River	235C	9	—	—	NII	X	X	—	X	—	X	X
Kah Sheets Creek and Lake	434S	9	—	—	II	X	X	X	—	X	—	—
Karta River-Salmon Lake	605K	32	—	—	SI	X	X	X	—	X	—	—
Katzehin River	9C	12	—	—	LC	X	—	—	X	—	X	—
Kegan Lake and streams	684K	8	—	—	SI	X	X	X	X	—	—	—
Keta River	841K	34	—	—	CR	X	—	—	—	—	—	—

[1]CR—Coast Range, LC—Lynn Canal, NOI—Northern Outer Islands, NII—Northern Interior Islands, II—Interior Islands, SI—Southern Islands, YF—Yakutat Forelands.

TABLE 3-146 (continued)
TONGASS NATIONAL FOREST TENTATIVELY ELIGIBLE RIVERS

River Name	VCU	Wild (Miles)	Scenic (Miles)	Rec-reation (Miles)	Geo-graphic Province[1]	Outstandingly Remarkable Values: Fish	Wildlife	Rec-reation	Scenic	Historic/ Cultural	Geology	Ecology
King Salmon River	143C	8	—	—	NII	X	—	—	—	—	—	—
Klahini River	790K	14	—	—	CR	—	X	—	X	—	—	—
Klakas Lake and streams	687K	9	—	—	SI	X	X	—	X	—	—	—
Kook Creek and Lake	239C	—	—	2	NOI	X	—	X	—	X	—	—
Kunk Creek and Lake	463S	2	—	—	II	X	X	X	X	—	—	—
Kushneahin Creek	431S	9	—	—	II	X	X	—	X	—	—	—
Kutlaku Creek and Lake	403S	2	—	—	II	X	—	—	—	X	—	—
Lace River	13C	20	—	—	LC	—	X	—	X	—	X	X
LeConte Glacier	491S	6	—	—	CR	—	—	X	X	—	—	—
Lisianski River	249C	5	—	—	NOI	X	X	—	X	—	—	X
Lost River-Tawah Creek	367C	—	—	10	YF	—	—	—	—	—	—	—
Maksoutof River Complex	330C	12	—	—	NOI	X	—	X	—	—	—	—
Marten Lake and Creek	509S	6	—	—	CR	X	X	X	X	—	—	—
Marten River	838K	20	—	—	CR	X	—	—	—	—	—	—
Mud Bay River	193C	5	—	4	NII	X	X	—	—	X	X	
Naha River	742K	17	—	—	II	X	X	X	—	X	—	—
Niblack lakes and streams	683K	5	—	—	SI	X	—	—	—	—	—	—
Nooya Creek	802K	2	—	—	CR	X	X	X	X	—	—	—
Nutkwa streams	686K	14	—	—	SI	X	X	X	X	—	—	—
Olive Creek	469S	3	—	1	II	X	—	X	—	—	—	—
Orchard Creek and Lake	733K	28	—	—	II	X	X	X	X	—	—	X
Patterson River	487S	4	—	3	CR	—	X	X	X	—	—	—
Pavlof River	218C	—	—	8	NII	X	—	X	—	X	X	—
Petersburg Creek	445S	7	—	—	II	X	—	X	X	X	—	—
Porcupine Creek	466S	2	—	—	II	X	X	X	—	—	—	—
Portage Creek	778K	10	—	—	II	—	—	—	—	X	—	—
Punchbowl Creek	803K	2	—	—	CR	—	—	—	X	—	—	—
Red Bluff Bay tributaries	329C	13	—	—	NOI	X	X	—	X	—	X	X
Rudyerd Creek	798K	16	—	—	CR	—	X	X	X	—	—	—
Salmon Bay Lake and streams	534K	10	—	8	SI	X	X	—	X	—	—	—

[1]CR—Coast Range, LC—Lynn Canal, NOI—Northern Outer Islands, NII—Northern Interior Islands, II—Interior Islands, SI—Southern Islands, YF—Yakutat Forelands.

TABLE 3-146 (continued)
TONGASS NATIONAL FOREST TENTATIVELY ELIGIBLE RIVERS

River Name	VCU	Wild (Miles)	Scenic (Miles)	Rec-reation (Miles)	Geo-graphic Province[1]	Outstandingly Remarkable Values: Fish	Wildlife	Rec-reation	Scenic	Historic/ Cultural	Geology	Ecology
Salmon River	806K	—	—	15	CR	—	—	—	—	—	X	—
Santa Anna Creek-Lake Helen	526S	4	—	—	CR	X	—	—	—	—	—	X
Sarkar Lakes	554K	25	—	—	SI	X	X	—	—	X	—	—
Scenery Creek	485S	8	—	—	CR	—	—	—	X	—	—	—
Shakes Slough	495S	10	—	—	CR	—	X	X	X	—	—	X
Shipley Creek and Lake	541K	9	—	—	SI	X	X	—	X	X	—	—
Sitkoh Creek	244C	—	4	—	NII	X	—	X	—	X	—	—
Sockeye Cr.-Hugh Smith Lake	836K	15	—	—	CR	X	—	—	—	—	—	—
Soda Creek and lake	632K	4	—	—	SI	X	X	—	—	—	X	—
Spring Creek-Lake Shelokum	726K	6	—	—	II	—	—	—	X	—	X	X
Stikine River	492S	—	25	—	CR	X	X	X	X	—	—	X
Taku River-Twin Glacier Lake	46C	—	25	—	CR	X	—	X	X	X	—	X
Thorne River-Hatchery Creek	553K	26	4	6	SI	—	—	X	X	—	—	—
Trail River	190C	6	—	—	NOI	—	X	—	—	X	—	X
Tunehean Creek	428S	8	—	—	II	X	—	—	—	—	—	—
Unuk River	784K	36	—	—	CR	X	X	X	X	X	—	—
Virginia Lake and Creek	502S	—	9	—	CR	X	—	X	—	—	—	—
Walker Creek and Lake	797K	7	—	—	CR	X	X	X	X	—	—	—
Ward Creek and Lake	750K	—	—	3	II	X	—	X	—	—	—	—
Whiting River	61C	25	—	—	CR	X	X	—	—	—	X	X
Wilson River and Lake	817K	11	4	—	CR	X	X	—	—	—	—	—
Wolverine Cr.-McDonald Lake	724K	6	—	—	II	X	X	X	—	—	—	—

[1]CR—Coast Range, LC—Lynn Canal, NOI—Northern Outer Islands, NII—Northern Interior Islands, II—Interior Islands, SI—Southern Islands, YF—Yakutat Forelands.

WILD AND SCENIC RIVERS

ENVIRONMENTAL CONSEQUENCES

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

The kinds and amounts of activities and changes acceptable within a river corridor depend on whether it is designated as a Wild, Scenic or Recreational river. Because the Forest Plan is not site specific, it is not possible to describe precisely how an individual stream may be affected by future projects, the exact location and nature of which are not yet determined. It is possible, however, to describe and to display the general effects of various management activities on the eligibility and potential classification of rivers by referring to groupings of management prescriptions which allow intensive development, moderate development, or retain an essentially unmodified natural setting (see the introduction to this chapter). These potential effects are described below in general terms. In Appendix E, the effects on each tentatively eligible river are described in more detail.

Specific kinds of forest activities and uses can affect the classification or eligibility of rivers. These are described in the next few paragraphs.

Timber Harvesting. Timber harvesting and associated road and log transfer facilities can have a major effect on the potential for a river to be considered eligible, and, if eligible, which classification it meets. Extensive, highly visible and ongoing timber harvesting within a river corridor could result in the river becoming ineligible for Wild or Scenic Status. Where timber harvest maintains the natural appearance of the forest as seen from the river and its banks, it may qualify for Scenic classification.

Water Project Development. Any major impoundment for water storage or hydroelectric power would cause a river segment to be ineligible. None of the tentatively eligible rivers is actively being considered for such a project at the present time. Low dams and diversions, penstocks, transmission lines and other facilities may affect the classification of the river, depending on their visibility and extent. Where they are visually subordinate, the river may be classified as a Recreational river. Where such features dominate the landscape, the river is likely to be ineligible.

Mining. Large scale mining activity could result in a tentatively eligible river becoming ineligible, or result in its being eligible only in the Recreational classification. Some types of mineral exploration which are visually subordinate may not affect the classification of a river as Scenic or Recreational.

Recreation Development. Development of trails, hike-in (or fly-in or boat-in) cabins, and campsites would not affect the Wild classification of a river, nor

would continuation of traditional access by motorized equipment. Development of major recreation sites, boat launches, and other visitor facilities would generally cause a river to meet only the Recreational classification.

Roads. Any construction of a public use road in the river corridor would eliminate that segment of river from classification as a Wild river. Construction of roads and bridges which occasionally cross or reach the river would not affect the classification of a Scenic river, assuming such roads are infrequent and relatively inconspicuous. Construction of a major highway or extensive road system could limit a river to the Recreational classification, where the valley is narrow and incised; in broad valley settings a major road could be compatible with the Scenic classification in some instances due to the scale of the landscape.

Fishery Improvements. Constructed fish passes and other structures associated with enhancement of fish habitat may occur in the Wild classification, if determined that the facility deos not significantly alter the free-flowing character of the river or conflict with the values for which the river is designated. Construction of an on-stream fish hatchery would be compatible only with the Recreational classification.

Conversely, designation of a river as a component of the National Wild and Scenic Rivers System can affect the management of various resources. The Wild and Scenic Rivers Act provides that the study boundary includes, at a minimum, the area within 1/4 mile either side of the high water mark of the river. Final boundaries can and do vary from this minimum, but generally follow the 1/4 mile guideline. Designation as a wild, scenic or recreational river in Alaska results in the establishement of a Conservation System Unit as defined by ANILCA. Where rivers are designated in Wilderness, the Wild and Scenic Rivers Act provides that the most restrictive provisions of the laws apply.

Designation as a *Wild River* results in the area being withdrawn from mineral entry. Scheduled commercial timber harvest is generally unacceptable and outputs of timber from tentatively suitable forest lands that might have occurred are essentially foregone. Construction of major recreation facilities, roads, powerlines and other features are not allowed. The potential for hydroelectric power generation is also foregone. Designation would not affect the rights of landowners within a wild river area unless zoning or other regulatory changes were enacted by local governments. Designation, particularly where tributary streams or important visual features lie outside the 1/4 mile corridor, could affect the management of lands adjacent to a wild river by requiring more constraints on water quality and visual effects of projects. The Wild and Scenic Rivers Act also requires that upstream water projects may not significantly degrade the river values within the designated segments and that downstream impoundments may not back water up into the designated segments.

Designation as a *Scenic River* places significant constraints on the management of timber in the river corridor, although small sales generally out of view of the river or recreation sites could occur. The area is not withdrawn from mineral entry, but costs of mining could increase as a result of standards for visual quality. The potential for hydroelectric power generation is foregone. Construction of major recreation facilities would not occur. Roads, while allowed, could be more expensive as design seeks to minimize the visual impact and the number of bridge crossings. Effects on management of adjacent lands would be less than for a wild river, although activities affecting sensitive visual features may be constrained resulting in increased cost or reduced output.

Designation as a *Recreational River* places fewer constraints on management and development activities, although the potential for new diversions and hydroelectric power generation is foregone. Timber may be harvested, although visual constraints can increase the cost of logging or reduce outputs slightly.

Suitability. Table 3-147 summarizes the number of river segments and miles by classification in the alternatives. Table 3-148 displays the allocation of individual streams by classification (Wild, Scenic and Recreational) in the alternatives. In some cases a stream is shown in a Wild classification in one alternative and in a different classification in another. The intent of this is to show the river designated in its current (most undeveloped) condition in one alternative, and to provide recognition to state and local infrastructure and transportation system development opportunities in another alternative, while still indicating the river is suitable to be considered for recommendation as a wild, scenic or recreational river.

In Alternative A the wild, scenic and recreational river management area prescriptions are applied to all 112 tentatively eligible rivers with a total of 1,504 miles.

TABLE 3-147
RIVERS, SEGMENTS AND MILES BY CLASSIFICATION BY ALTERNATIVES

	Alternative A		
Class	**Miles**	**Segments**	**Rivers**[1]
Wild	1206	90	-
Scenic	137	12	-
Recreation	161	17	-
Total	1504	119	112

	Alternative B		
Class Miles	**Segments**		**Rivers**[1]
Wild	632	45	-
Scenic	150	12	-
Recreation	144	14	-
Total	926	71	67

	Alternative D		
Class	**Miles**	**Segments**	**Rivers**[1]
Wild	365	21	-
Scenic	45	4	-
Recreation	14	3	-
Total	424	28	28

[1] **Number of segments exceeds the number of rivers because some rivers have several segments that qualify in different classifications. All or parts of 112 eligible rivers are represented in the tables.**

In Alternative B, the Wild, Scenic and Recreational river area prescriptions are applied to 67 tentatively eligible rivers with a total of 926 miles, representing the range of ecosystems and features typical of the seven geographic provinces of Southeast Alaska, as shown in Table 3-149. (The geographical provinces are described in Chapter 3, Research Natural Areas.

Alternative D applies the Wild, Scenic and Recreational River management area prescriptions to 28 rivers with a total of 424 miles.

TABLE 3-148
ELIGIBLE AND SUITABLE RIVERS AND MILES BY ALTERNATIVE[1]

River Name	VCU	Geographic Province	Alternative A Wild-life	Alternative A Scenic	Alternative A Recre-ation	Alternative B Wild-life	Alternative B Scenic	Alternative B Recre-ation	Alternative D Wild-life	Alternative D Scenic	Alternative D Recre-ation
Arron, Oerns, Berg Creeks	503S	CR	37	—	—	—	37	—	—	—	—
Alecks Creek and Lake	405S	SI	5	—	—	5	—	—	5	—	—
Alpine Creek (local)	495S	CR	3	—	—	3	—	—	3	—	—
Anan Creek	522S	CR	18	—	—	18	—	—	18	—	—
Andrews Creek	493S	CR	15	2	—	15	2	—	15	2	—
Antler River	14C	LC	13	—	—	—	—	—	—	—	—
Baird Glacier	482S	CR	20	—	—	20	—	—	20	—	—
Bakewell Creek–Badger Lake	826K	CR	17	—	—	—	—	—	—	—	—
Benzeman River	347C	NOI	14	—	—	—	—	—	—	—	—
Berner's River	12C	LC	10	—	—	8	—	—	—	—	—
Big Branch tributary	341C	NOI	12	—	—	—	—	—	—	—	—
Big Creek	674K	SI	5	—	—	5	—	—	—	—	—
Big Goat Creek and Lake	802K	CR	6	—	—	—	—	—	—	—	—
Black River	272C	NOI	9	—	—	—	—	—	—	—	—
Blind River	451S	II	—	—	5	—	—	5	—	—	5
Blossom River	815K	CR	12	13	—	—	—	—	—	—	—
Blue River	787K	CR	17	—	—	17	—	—	17	—	—
Bradfield River East Fork	517S	CR	—	—	19	—	—	19	—	—	—
Bradfield River North Fork	514S	CR	—	—	27	—	—	27	—	—	—
Canoe Point stream	625K	SI	3	—	—	—	—	—	—	—	—
Cascade Creek	486S	CR	5	—	—	5	—	—	5	—	—
Castle River	435S	II	23	—	—	—	—	23	—	—	—
Cathedral Falls Creek	425S	II	—	1	—	—	—	—	—	—	—
Chickamin River	797K	CR	113	—	—	113	—	—	112	—	—
Chuck River	76C	CR	15	—	—	15	—	—	—	—	—
Dangerous River	377C	YF	—	23	—	—	23	—	—	—	—
Duncan Salt Chuck, Creek	441S	II	10	—	—	4	—	—	4	—	—
Eagle River	26C	LC	—	—	6	—	—	—	—	—	—
Eagle River and Lake	519S	CR	12	—	—	—	12	—	—	12	—
Earl West Creek (local)	478S	II	—	—	9	—	—	9	—	—	—

[1]No eligible and suitable rivers were included in Alternative C.

TABLE 3-148 (continued)
ELIGIBLE AND SUITABLE RIVERS AND MILES BY ALTERNATIVE[1]

			Alternative A			Alternative B			Alternative D		
River Name	VCU	Geographic Province	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation
Endicott River	66C	LC	21	—	—	—	—	—	—	—	—
Essowah Lake and streams	659K	SI	13	—	—	13	—	—	—	—	—
Fall Dog Creek (local)	400S	II	3	—	—	3	—	—	—	—	—
Falls Creek and McHenry Lake	472S	II	2	—	—	—	—	—	—	—	—
Farragut River	90S	CR	30	—	—	30	—	—	—	—	—
Fish Creek	806K	CR	—	—	4	—	—	4	—	—	—
Fred's Creek	308C	NOI	5	—	—	5	—	—	—	—	—
Gambier Bay tributaries	170C	NII	14	—	—	—	—	—	—	—	—
Gilkey River	15C	LC	9	—	—	—	—	—	—	—	—
Glacial River	314C	NOI	10	—	—	10	—	—	—	—	—
Gokachin-Mirror-Low-Fish Cr.	754K	II	30	—	—	28	2	—	—	—	—
Granite Creek-Manzoni Lake	800K	CR	8	—	—	—	—	—	—	—	—
Hamilton Creek	425S	II	—	20	—	—	20	—	—	—	—
Harding River	511S	CR	16	—	—	—	—	—	—	—	—
Harris River	610K	SI	—	—	7	—	—	7	—	—	—
Hasselborg Creek and Lakes	157C	NII	25	—	—	25	—	—	25	—	—
Hatchery Creek and Lake	472S	II	2	—	—	2	—	—	—	—	—
Herbert River	26C	LC	—	—	6	—	—	6	—	—	—
Hulakon River	786K	CR	7	—	—	—	—	—	—	—	—
Humpback Creek and Lake	834K	CR	14	—	—	—	—	—	—	—	—
Hunter Bay lakes and streams	694K	SI	22	—	—	22	—	—	13	—	—
Irish Creek-Keku Creek	428S	II	10	7	—	—	8	—	—	—	—
Johnson Lake and streams	692K	SI	5	—	—	5	—	—	—	—	—
Kadake Creek	421S	II	5	—	18	—	—	16	—	—	—
Kadashan River	235C	NII	9	—	—	9	—	—	—	—	—
Kah Sheets Creek and Lake	434S	II	9	—	—	5	—	—	—	—	—
Karta River-Salmon Lake	605K	SI	32	—	—	32	—	—	—	—	—
Katzehin River	9C	LC	12	—	—	10	—	—	—	—	—
Kegan Lake and streams	684K	SI	8	—	—	8	—	—	—	—	—
Keta River	841K	CR	34	—	—	—	—	—	—	—	—

[1]No eligible and suitable rivers were included in Alternative C.

TABLE 3-148 (continued)
ELIGIBLE AND SUITABLE RIVERS AND MILES BY ALTERNATIVE[1]

			Alternative A			Alternative B			Alternative D		
River Name	VCU	Geographic Province	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation
King Salmon River	143C	NII	8	—	—	8	37	—	8	—	—
Klahini River	790K	CR	14	—	—	—	—	—	—	—	—
Klakas Lake and streams	687K	SI	9	—	—	9	—	—	9	—	—
Kook Creek and Lake	239C	NII	—	—	2	—	—	—	—	—	—
Kunk Creek and Lake	463S	II	2	—	—	—	2	—	—	—	—
Kushneahin Creek	431S	II	9	—	—	—	—	—	—	—	—
Kutlaku Creek and Lake	403S	II	2	—	—	—	—	—	—	—	—
Lace River	13C	LC	20	—	—	—	—	—	—	—	—
LeConte Glacier	491S	CR	6	—	—	6	—	—	6	—	—
Lisianski River	249C	NOI	5	—	—	5	—	—	—	—	—
Lost River-Tawah Creek	367C	YF	—	—	10	—	—	10	—	—	—
Maksoutof River Complex	330C	NOI	12	—	—	—	—	—	—	—	—
Marten Lake and Creek	509S	CR	6	—	—	—	6	—	—	6	—
Marten River	838K	CR	20	—	—	—	—	—	—	—	—
Mud Bay River	193C	NII	5	—	4	—	—	—	—	—	—
Naha River	742K	II	17	—	—	17	—	—	17	—	—
Niblack lakes and streams	683K	SI	5	—	—	—	—	—	—	—	—
Nooya Creek	802K	CR	2	—	—	—	—	—	—	—	—
Nutkwa streams	686K	SI	14	—	—	14	—	—	—	—	—
Olive Creek	469S	II	3	—	1	3	—	1	—	—	—
Orchard Creek and Lake	733K	II	28	—	—	—	—	—	—	—	—
Patterson River	487S	CR	4	—	3	—	—	—	—	—	—
Pavlof River	218C	NII	—	—	8	—	—	8	—	—	—
Petersburg Creek	445S	II	7	—	—	7	—	—	7	—	—
Porcupine Creek	466S	II	2	—	—	—	—	—	—	—	—
Portage Creek	778K	II	10	—	—	—	—	—	—	—	—
Punchbowl Creek	803K	CR	2	—	—	—	—	—	—	—	—
Red Bluff Bay tributaries	329C	NOI	13	—	—	—	—	—	—	—	—
Rudyerd Creek	798K	CR	16	—	—	16	—	—	16	—	—
Salmon Bay Lake and streams	534K	SI	10	—	8	—	—	—	—	—	—

[1]No eligible and suitable rivers were included in Alternative C.

TABLE 3-148 (continued)
ELIGIBLE AND SUITABLE RIVERS AND MILES BY ALTERNATIVE[1]

			Alternative A			Alternative B			Alternative D		
River Name	VCU	Geographic Province	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation	Wild-life	Scenic	Recre-ation
Salmon River	806K	CR	—	—	15	—	—	—	—	—	—
Santa Anna Creek-Lake Helen	526S	CR	4	—	—	4	—	—	—	—	—
Sarkar Lakes	554K	SI	25	—	—	—	—	—	—	—	—
Scenery Creek	485S	CR	8	—	—	8	—	—	8	—	—
Shakes Slough	495S	CR	10	—	—	10	—	—	10	—	—
Shipley Creek and Lake	541K	SI	9	—	—	9	—	—	—	—	—
Sitkoh Creek	244C	NII	—	4	—	—	—	—	—	—	—
Sockeye Cr.-Hugh Smith Lake	836K	CR	15	—	—	—	—	—	—	—	—
Soda Creek and lake	632K	SI	4	—	—	4	—	—	—	—	—
Spring Creek-Lake Shelokum	726K	II	6	—	—	6	—	—	6	—	—
Stikine River	492S	CR	—	25	—	—	25	—	—	25	—
Taku River-Twin Glacier Lake	46C	CR	—	25	—	—	—	—	—	—	—
Thorne River-Hatchery Creek	553K	SI	26	4	6	22	4	6	—	—	6
Trail River	190C	NOI	6	—	—	6	—	—	—	—	—
Tunehean Creek	428S	II	8	—	—	—	—	—	—	—	—
Unuk River	784K	CR	36	—	—	36	—	—	34	—	—
Virginia Lake and Creek	502S	CR	—	9	—	—	9	—	—	—	—
Walker Creek and Lake	797K	CR	7	—	—	7	—	—	7	—	—
Ward Creek and Lake	750K	II	—	—	3	—	—	3	—	—	3
Whiting River	61C	CR	25	—	—	—	—	—	—	—	—
Wilson River and Lake	817K	CR	11	4	—	—	—	—	—	—	—
Wolverine Cr.-McDonald Lake	724K	II	6	—	—	—	—	—	—	—	—

[1]No eligible and suitable rivers were included in Alternative C.

TABLE 3-149
ALTERNATIVE B - RIVERS REPRESENTING SOUTHEAST ALASKA GEOGRAPHIC PROVINCES

Coast Range
Chickamin River
Fish Creek
Bradfield E. Fork
Bradfield N. Fork
Marten Lake, Creek
Virginia Lake, Cr.
Eagle River, Lake
Stikine River
Arron, Orens, Berg
Santa Anna Creek
Cascade Creek
LeConte Glacier
Walker Creek, Lake
Scenery Creek
Shakes Slough
Chuck River
Rudyerd Creek
Andrews Creek
Blue River
Anan Creek
Baird Glacier
Farragut River
Unuk River

Yakutat Forelands

Dangerous River
Lost River-Tawah Cr.

Lynn Canal
Herbert River
Katzehin River
Berner's River

Interior Islands

Ward Creek, Lake
Blind River
Earl West Creek
Hamilton Creek
Castle River
Kunk Creek, Lake
Irish-Keku Creeks
Kadake Creek
Hatchery Creek
Fall Dog Creek
Olive Creek
Duncan Salt Chuck
Spring Cr.-Shelokum
Petersburg Creek
Kah Sheets Cr., Lake
Naha River
Gokachin-Low Lakes

Northern Outer Islands
Lisianski River
Fred's Creek
Glacial River
Trail River

Northern Interior Islands

Hasselborg Creek, Lakes
King Salmon River

Southern Islands

Harris River
Soda Creek, Lake
Aleck's Creek, Lake
Johnson Creek, Lakes
Big Creek
Kegan Lake, Streams
Klakas Lakes, Streams
Shipley Creek
Essowah Lake, Streams
Nutkwa Streams
Hunter Bay Streams
Thorne R.-Hatchery Cr
Karta River

Effects of Designation. In *Alternative A*, 112 rivers with 1,504 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 38 rivers with 578 miles are in existing wilderness areas and national monuments. Twenty rivers with 234 miles are in areas proposed as wilderness in H.R. 987. Three rivers with 12 miles are in existing and proposed research natural areas. Fifty-five rivers with 680 miles are outside wilderness, proposed wilderness and research natural areas on National Forest System Lands currently available for multiple use management in accordance with the current Forest Plan. In general, the classification of the recommended rivers is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 481,000 acres in the National Wild and Scenic Rivers System and would preserve the free-flowing character and outstandingly remarkable values of the rivers. It would eliminate the opportunity for major water resource development projects on 1,504 miles of river.

Designation would include some 185,000 acres in existing wilderness and national monuments, and 65,000 acres in areas recommended as wilderness; these designations would have no effect on other resource uses, although they would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects. (In wilderness, the President may approve a water resource development.) Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to wild and scenic rivers in Wilderness unless the legislation in the specific designation law includes these exceptions. ANILCA provision that apply to Conservation System Units would apply to wild and scenic rivers.

About 217,000 acres currently available for multiple use management would be affected by the designation; 146,000 acres would be managed as Wild Rivers outside of existing classified areas, and would be withdrawn from mineral entry. The 217,000 acres contains an estimated 65,000 acres of tentatively suitable forest land which would be unavailable for scheduled harvest or allow only restricted entry for timber harvest. A portion of the tentatively suitable lands would be managed in the Stream and Lake Protection management area prescription regardless of designation.

In *Alternative B*, 67 rivers with 926 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 19 rivers with 334 miles are in existing wilderness areas and national monuments. One river with 5 miles is in existing and proposed research natural areas. Forty-seven rivers with 587 miles are outside wilderness, proposed wilderness and research natural areas on National Forest System Lands currently available for multiple use management in accordance with the current Forest Plan. In general, the classification of the recommended rivers is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 296,000 acres in the National Wild and Scenic Rivers System and would preserve the free-flowing character and outstandingly remarkable values of about 62 percent of the eligible rivers on the Tongass. The opportunity for development of major water resource projects would be eliminated on 926 miles of river.

Designation would include some 107,000 acres in existing wilderness and national monuments. These designations would have no effect on other resource uses, although they would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects.

About 188,000 acres currently available for multiple use management would be affected by the designation; 99,000 acres would be managed as Wild Rivers outside of existing classified areas, and would be withdrawn from mineral

entry. The 188,000 acres contains an estimated 56,000 acres of tentatively suitable forest land which would be unavailable for scheduled harvest or allow only restricted entry for timber harvest. A portion of the tentatively suitable lands would be managed in the Stream and Lake Protection management area prescription regardless of designation.

In *Alternative D*, twenty-eight rivers with 424 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 16 rivers with 262 miles are in existing wilderness areas and national monuments. Twelve rivers with 162 miles are outside wilderness on National Forest System Lands currently available for multiple use management in accordance with the current Forest Plan. In general, the classification of the recommended rivers is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 135,000 acres in the National Wild and Scenic Rivers System and would preserve the free-flowing character and outstandingly remarkable values of the rivers. Opportunity for major water resource development projects would be eliminated on 424 miles of river.

Designation would include some 84,000 acres in existing wilderness and national monuments. These designations would have no effect on other resource uses, although they would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects.

About 52,000 acres currently available for multiple use management would be affected by the designation; 22,000 acres would be managed as Wild Rivers outside of existing classified areas, and would be withdrawn from mineral entry. The 52,000 acres contains an estimated 16,000 acres of tentatively suitable forest land which would be unavailable for scheduled harvest or allow only restricted entry for timber harvest. A portion of the tentatively suitable lands would be managed in the Stream and Lake Protection management area prescription regardless of designation.

Alternatives C, E, F and G do not recommend designation of Wild and Scenic Rivers. With no designation, there are no effects to other resources and uses. In these alternatives the tentatively eligible rivers are subject to multiple use management in accordance with the management area prescriptions to which adjacent lands are allocated. Tentatively eligible rivers in wilderness and national monuments would be likely to retain their free-flowing character and outstandingly remarkable values. The 926 miles of tentatively eligible river outside wilderness would remain open to mineral entry and would retain the opportunity for water resource development.

Table 3-150 summarizes the recommendation of eligible Wild, Scenic and Recreational rivers in classified and unclassified areas.

TABLE 3-150
RECOMMENDED RIVER MILES IN CLASSIFIED AND UNCLASSIFIED AREAS BY ALTERNATIVE

Miles	*Alt A*	*Alt B*	*Alt C*	*Alt D*	*Alt E*	*Alt F*	*Alt G*
WILD RIVERS							
Miles in Existing Wilderness	534	309	—	262	—	—	—
Miles in Research Natural Areas	12	5	—	—	—	—	—
Miles in Recommended Wilderness	203	136	—	35	—	—	—
Subtotal	749	450	—	297	—	—	—
Miles in Unclassified Areas	457	182	—	68	—	—	—
Total Wild Miles	1,206	632	—	365	—	—	—
SCENIC RIVERS							
Miles in Existing Wilderness	44	29	—	27	—	—	—
Miles in Research Natural Areas	—	—	—	—	—	—	—
Miles in Recommended Wilderness	31	30	—	—	—	—	—
Subtotal	75	59	—	27	—	—	—
Miles in Unclassified Areas	62	91	—	18	—	—	—
Total Scenic Miles	137	150	—	45	—	—	—
RECREATION RIVERS							
Miles in Existing Wilderness	0	0	—	—	—	—	—
Miles in Research Natural Areas	0	0	—	—	—	—	—
Miles in Recommended Wilderness	0	0	—	—	—	—	—
Subtotal	0	0	—	—	—	—	—
Miles in Unclassified Areas	161	144	—	14	—	—	—
Total Recreation Miles	161	144	—	14	—	—	—

Effects of Alternatives

Table 3-151 displays the allocation of the tentatively eligible river eligible river miles to groupings of management prescriptions by alternative. Eligible rivers that are allocated to the "intensive development" management prescriptions are likely to either become ineligible or to meet the Recreational classification after implementation of the alternative, depending on site specific project location and design.

TABLE 3-151
EFFECTS OF ALTERNATIVES ON TENTATIVELY ELIGIBLE RIVERS

Miles	*Alt A*	*Alt B*	*Alt C*[1]	*Alt D*	*Alt E*	*Alt F*	*Alt G*
Eligible river miles remaining in natural setting (Present condition and classification maintained)	1,504	1,485	1,021	1,039	1,103	1,064	1,073
Eligible river miles subject to moderate development and change in classification	0	55	233	78	216	220	222
Eligible river miles subject to intensive development for timber harvest and loss of eligibility	0	66	250	387	185	221	209
Total Eligible Miles	1,504	1,504	1,504	1,504	1,504	1,504	1,504

[1] For Alternative C, the "Natural Setting" group is equivalent to TLMP LUD I and LUD II, the "Moderate Development" group is equivalent to LUD III, and the "Intensive Development" group is equivalent to LUD IV.

Tentatively eligible rivers that are allocated to the "moderate development" management prescriptions are likely to qualify only for the scenic or recreational classifications after implementation, depending on site specific project location and design.

Tentatively eligible rivers that are allocated to the "natural setting" management prescriptions (which includes Wilderness and Wild and Scenic River designation) are very likely to retain their eligibility and potential classification after implementation. However, unless they are in wilderness or designated as Wild and Scenic Rivers, the river corridors remain open to mineral entry and the development of water resources. Since proposals for these activities cannot be predicted with any accuracy, their potential effect on tentatively eligible rivers was not analyzed.

In *Alternative A* all of the 112 tentatively eligible rivers with 1,504 miles are recommended for designation as components of the National Wild and Scenic Rivers System. As designated rivers, they are managed under the Wild River, Scenic River and Recreational River management area prescriptions and retain their free-flowing character and outstandingly remarkable values.

In *Alternative B*, 926 miles of tentatively eligible rivers are recommended for designation and retain their free-flowing character and outstandingly remarkable values. An additional 357 tentatively eligible river miles are in management

areas which generally retain the present character of the river areas and the outstandingly remarkable values. Fifty-five miles are in management areas which allow a moderate level of development including roads, recreation facilities and some forms of timber harvest. River segments in these management areas would likely not remain in the Wild River classification. Sixty-six miles are in management areas allowing intensive development for timber harvest and may become ineligible as projects are implemented.

In *Alternative C*, 1,021 tentatively eligible river miles are in management areas which have a high probability of retaining the present character of the river areas and their outstandingly remarkable values. However, 233 miles are in moderate development management areas (equivalent to LUD 3) and 250 miles are in intensive development management areas (equivalent to LUD 4). Alternative C potentially affects the classification or eligibility of the greatest number of eligible river miles, 488 miles, or 32 percent of the tentatively eligible river miles on the Tongass.

Alternative D retains a similar number of miles in their present character as does Alternative C, 1,039 miles, which includes the 424 miles recommended for designation. Although Alternative D potentially affects slightly fewer miles of eligible rivers than does Alternative C, 465 miles, 387 miles are in management areas allowing intensive development for timber harvest. Among the alternatives, Alternative D has the greatest potential to cause rivers to become ineligible.

Alternatives E, F, and G are similar in their effect Forest-wide. Generally, these alternatives retain about 1,100 miles of the 1,504 eligible river miles in management areas which do not affect the present character of the river areas, and allow development on 400-440 miles of tentatively eligible river corridor. However, Alternative E provides a somewhat greater degree of certainty that tentatively eligible rivers retain their present character by recommending additional wilderness containing 234 river miles.

WILDERNESS

AFFECTED ENVIRONMENT

Introduction

This section describes existing Wilderness and the general aspects of wilderness management direction in Alaska. For effects of potential new Wilderness designation, see the Roadless Area section.

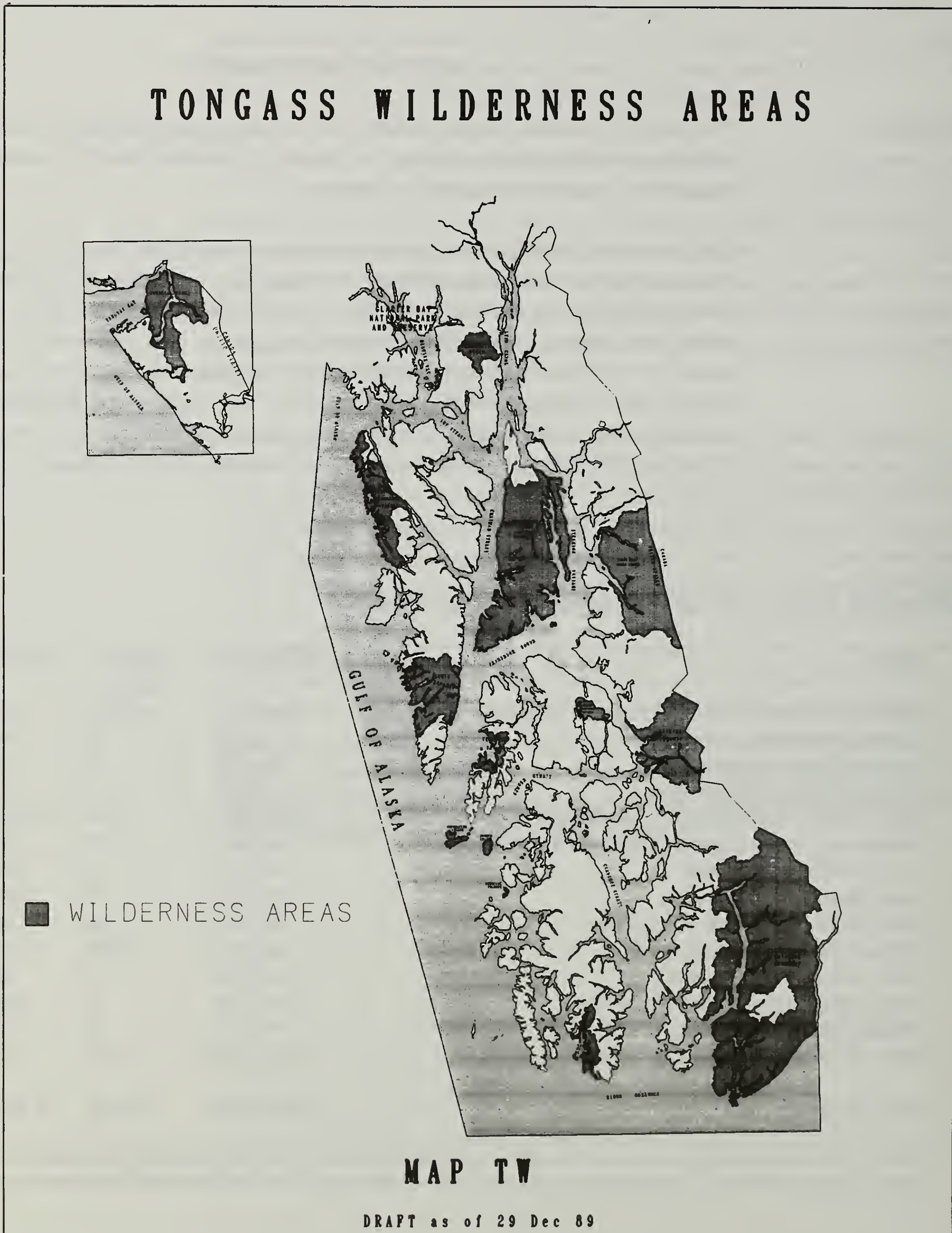
On December 2, 1980, through the enactment of Public Law 96-487, the Alaska National Interest Lands Conservation Act (ANILCA), Congress designated 43 areas as wilderness totaling 56.4 million acres in Alaska as a part of the 91 million acre National Wilderness Preservation System. Included were 5.5 million acres in 14 Wildernesses established on the Tongass National Forest (see table 3-152 and Figure 3-54). Two of the areas, Admiralty Island Wilderness and Misty Fiords Wilderness, were also designated as National Monuments. Prior to ANILCA there was no designated wilderness on the Tongass.

TABLE 3-152
WILDERNESS AREAS ON THE TONGASS NATIONAL FOREST

Name	*Total Acres*	*Non-NF Acres*	*NF Acres*
Admiralty Island National Monument Wilderness	969,564	32,168	937,396
Coronation Island Wilderness	19,232	0	19,232
Endicott River Wilderness	98,729	0	98,729
Maurelle Islands Wilderness	4,937	0	4,937
Misty Fiords National Monument Wilderness	2,142,907	664	2,142,243
Petersburg Creek-Duncan Salt Chuck Wilderness	46,849	72	46,777
Russell Fiord Wilderness	348,701	0	348,701
South Baranof Wilderness	319,568	0	319,568
South Prince of Wales Wilderness	91,018	22	90,996
Stikine-LeConte Wilderness	449,951	1,025	448,926
Tebenkof Bay Wilderness	66,839	0	66,839
Tracy Arm-Fords Terror Wilderness	653,179	0	653,179
Warren Island Wilderness	11,181	0	11,181
West Chichagof-Yakobi Wilderness	265,529	782	264,747
Total Acreage	**5,488,184**	**34,733**	**5,453,451**

Source: Acreages as reported to Congress with official boundary maps. These acreages may change over time as mining claims or State and Native land selections are patented. These wildernesses include only the public lands above mean high tide.

FIGURE 3-54


TONGASS WILDERNESS AREAS
GULF OF ALASKA
WILDERNESS AREAS
MAP TW
DRAFT as of 29 Dec 89

Current Situation

The various wildland ecosystems of Southeast Alaska are found within the 14 Tongass wilderness areas, including 1.5 million acres of old-growth forest (see Figure 3-55). These areas are representative of the seven geographic provinces of Southeast Alaska, and include glaciers and icefields, offshore islands and seacoasts facing the open Pacific Ocean and inland passages, old-growth temperate rain forests, and major river systems. Two of the largest areas, Admiralty Island National Monument Wilderness and Misty Fiords National Monument Wilderness, contain vast, virtually intact ecosystems. The wildernesses are mostly in a pristine condition, with the imprint of humans substantially not noticeable. They offer outstanding opportunities for solitude and primitive recreation. (Each Wilderness area is described and discussed in detail in the Technical Analysis of the Management Situation, Tongass National Forest, January 1990)

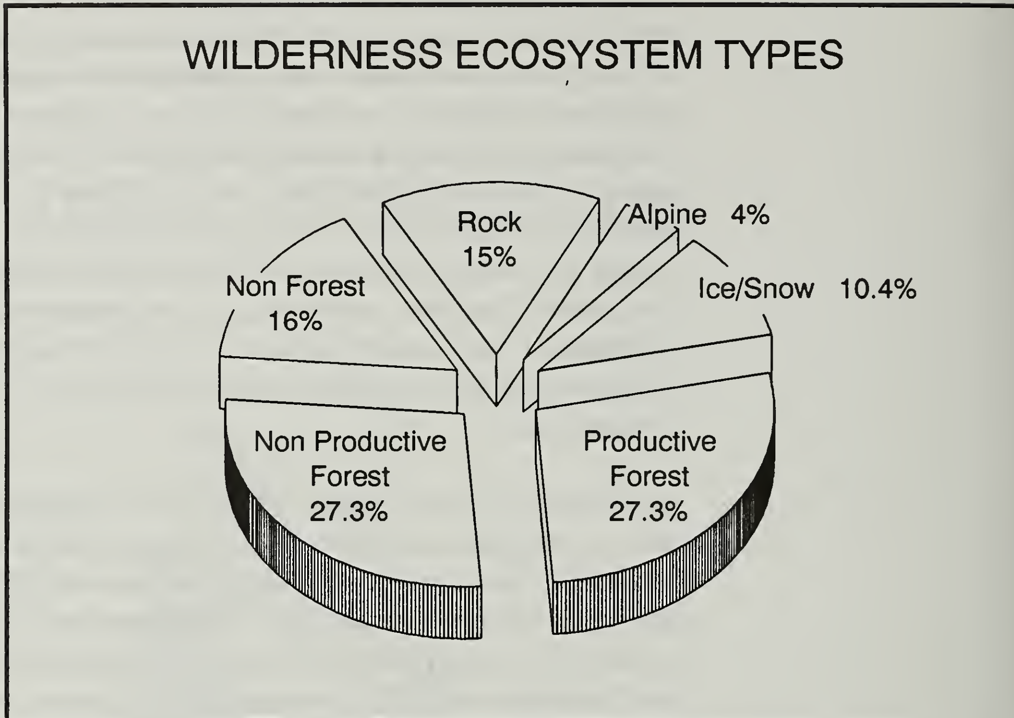
Monitoring has been minimal in most of the wilderness, but has shown some resource damage and user conflict in localized concentrated use areas, indicating a need for increased management presence and for public education on minimum impact camping techniques and appropriate use of wilderness. The very limited monitoring in some of the remote wildernesses, such as South Prince of Wales and Coronation Island Wildernesses, indicates very little use but some resource damage and occupancy trespass. The areas with the greatest use and most management activities tend to have the greatest need for additional management direction and standards and guidelines to resolve user conflicts and preserve the wilderness resource.

The Role of Wilderness

Wilderness Act. The National Wilderness Preservation Act of 1964 mandates that designated "wilderness areas"--- "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.

Subject to existing private rights, the Act prohibits permanent roads and, except as necessary for realizing the recreation and other wilderness purposes of the area, commercial enterprises. Temporary roads, the use of motor vehicles, motorized equipment, other mechanized equipment, motorboats, the landing of aircraft, and structures and installations are prohibited except as necessary to meet minimum requirements for the administration of the area as wilderness. The Act provides that the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to restrictions by the Secretary of Agriculture. Wildernesses were withdrawn from mineral entry as of December 31, 1983, and patenting of valid claims is limited to subsurface mineral rights.

FIGURE 3-55



ANILCA. In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the prohibitions of the Wilderness Act. Some of these follow.

1. *Subsistence Policy*. Section 811 mandates that the Secretary "shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands." This section further directs that, other laws (including the Wilderness Act) notwithstanding, the Secretary "shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation."

2. *Special Access*. Section 1110(a) requires that the Secretary "shall permit" on Conservation Units, which includes Wilderness, "the use of snowmachines (during periods of adequate snow cover or frozen river conditions in the case of wild or scenic rivers),

motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites." Such use is subject to reasonable regulation but shall not be prohibited unless after notice and hearing the Secretary finds that such use would be detrimental to the resource values of the area.

3. *Inholding Access*. Section 1110(b) assures adequate and feasible access to State and private land and to valid occupancies including valid mining claims.

4. *Navigation Aids and Facilities*. Section 1310(a) provides that reasonable access to, and operation and maintenance of, existing air and water navigation aids, communication sites, facilities for national defense, and related facilities and existing facilities for weather, climate and fisheries research and monitoring shall be permitted. "Nothing in the Wilderness Act shall be deemed to prohibit such access, operation and maintenance within wilderness areas designated by this Act." Section 1310(b) provides that the establishment, operation and maintenance of new such facilities shall be permitted within wilderness after consultation with the Secretary and in accordance with mutually agreed upon terms and conditions to minimize the adverse effects within the Unit.

5. *Aquaculture*. Section 1315(b) provides that the Secretary may permit fishery research, management, enhancement, and rehabilitation activities within National Forest System Wilderness, in a manner which adequately assures protection, preservation, enhancement and rehabilitation of the wilderness resource. Subject to reasonable regulations, permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, and stream clearance, egg planting and other accepted means of maintaining, enhancing, and rehabilitating fish stocks may be permitted.

6. *Public Use Cabins*. Section 1315(c) provides for the continued use, maintenance and replacement of existing Public Use Cabins within wilderness. Section 1315(d) authorizes the construction and maintenance of a limited number of new public use cabins and shelters, if necessary, for public health and safety, and also requires the Secretary to notify Congress of his intention to remove an existing or construct a new public use cabin or shelter.

7. *Beach Log Salvage*. Section 1315(f) allows the Secretary to permit or otherwise regulate the recovery and salvage of logs from the coastlines of National Forest wilderness and monuments.

8. *Temporary Hunting and Fishing Facilities*. Section 1316(a) provides that the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuation of existing uses and future establishment and use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and game. Facilities and equipment shall be constructed, used and maintained in a manner consistent with the protection of the area where they are located. New facilities shall be constructed of materials which blend with and are compatible with the surrounding landscape. Section 1316(b) allows the Secretary to deny new facilities and equipment upon making a determination, after public notice, that the establishment and use of new facilities or equipment would constitute a significant expansion of existing facilities or uses which would be detrimental to the purposes for which the unit was established, including "wilderness character."

Wilderness Act Applies

In spite of its many exceptions to the Wilderness Act, ANILCA defines "wilderness" to have the same meaning as when used in the Wilderness Act (Sec. 102(13). Further, Sec.707 states that except as expressly provided in ANILCA, Alaskan wilderness "shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness." Therefore, activities not discussed in ANILCA must be administered in accord with the Wilderness Act just the same as wilderness in other parts of the country.

Other Direction

The Tongass Land Management Plan was completed prior to the enactment of ANILCA. The Tongass Land Management Plan was amended in 1985-86, but the amendment deferred specific management direction to individual wilderness management direction documents. Only five of these had been approved before an appeal of the Stikine-LeConte Wilderness Plan resulted in a decision by the Chief of the Forest Service that modified existing regional direction regarding the use of helicopters by the public (no longer allowed unless the use had been established prior to ANILCA), and the use of chainsaws and generators by cabin permittees (to be phased out) in wilderness. Management direction for the other nine Wilderness areas has not been completed at this time (Analysis of the Management Situation, Tongass National Forest, January 1990)

Implementation of existing direction has varied greatly between the various wildernesses. Some areas, such as Admiralty and Misty Fiords Wildernesses, have had significant management programs and accomplishments, while others

have had minimal management activities. Some of the management activities, such as fisheries enhancement projects and the authorization of temporary facilities for the taking of fish and wildlife, have resulted in administrative appeals by user groups who view these activities as conflicting with their use or with wilderness values.

The opportunity exists through the Forest Plan Revision process to establish a framework of consistent management direction, with standards and guidelines, for all 14 wildernesses. The proposed standards and guidelines (See Appendixes F & G) are responsive to identified public issues and management concerns. Implementation schedules for each of the individual wildernesses can then be prepared to provide area-specific details for implementing the standards and guidelines.

WILDERNESS

ENVIRONMENTAL CONSEQUENCES

EFFECTS AND MITIGATION

The principal effect of implementing any of the alternatives will be to apply the Wilderness (WW) and National Monument Wilderness (WM) management prescriptions to all designated wilderness (See Appendix F). The standards and guidelines in the prescriptions incorporate the management direction provided by the Regional Forester in Region 10 Supplement No. 46, effective February 26, 1990. This supplement, in addition to clarifying and defining the management of ANILCA exceptions in wilderness, also requires the development of a wilderness implementation schedule for each designated wilderness that will apply the standards and guidelines to individual areas and situations.

Application of the standards and guidelines will result in more consistent management of designated wilderness, incorporating the decisions resulting from the Stikine-LeConte Wilderness Management Plan appeal subsequent direction, and interpretations of ANILCA exceptions. Since the areas already designated as wilderness are withdrawn from mineral entry (subject to valid existing rights), there are no additional effects on other resources and uses, including subsistence activities.

In alternatives which recommend wilderness designation for additional areas, those proposed wilderness areas will be considered "preliminary administrative recommendations" until that recommendation is forwarded to Congress and Congress acts to designate them, or "release" them from further consideration for designation. These areas are shown as "Recommended Wilderness" (RW) in the map packet. During this interim period, the recommended areas will be managed to preserve their potential as wilderness by applying the Primitive Recreation prescription (PR), while allowing those current uses which do not adversely affect wilderness characteristics to continue.

Alternatives A and E recognize the expressed intent of the House of Representatives in the passage of H.R. 987, which would designate 1.8 million acres of roadless lands as wilderness. If all recommended areas were designated by Congress, 7.3 million acres of the Tongass National Forest would be managed as wilderness. There would be 29 separate Wildernesses on the Forest (fifteen additional separate areas and eight additions to existing areas). No additional wilderness is recommended in the other alternatives. All areas for which the public expressed interest in Wilderness consideration during scoping are included within H.R. 987. For further analysis and descriptions of these areas, refer to the Roadless Areas section.

WILDLIFE

AFFECTED ENVIRONMENT

INTRODUCTION

This section begins with an overview of animal species in Southeast Alaska, followed by a more detailed discussion of species identified as management indicator species. The last half of the wildlife section focuses on the potential effect that implementation of each alternative is projected to have on the habitat conditions and population trends of the management indicator species.

The Tongass National Forest provides habitat for 54 species of mammals (this number includes the recently introduced elk on Etolin Island), 231 species of birds and five species of amphibians and reptiles (Taylor 1979). There are an additional 18 species of marine mammals found in Southeast Alaska which depend entirely on the ocean environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and three species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor 1979). These species provide many opportunities for consumptive and nonconsumptive use by the public, including commercial, sport, subsistence, and photographic and viewing activities. The Forest is rich in its varied and unique species. Some of the species found on the Forest in abundance are threatened or endangered in other parts of the United States. Table 3-153 summarizes the scientific orders of birds, mammals, reptiles, and amphibians occurring in Southeast Alaska.

Mammals

There is not a good understanding of the abundance and distribution of many of the species in the orders Insectivora, Chiroptera, Lagomorpha, and Rodentia. Current knowledge indicates that the species of hares and rabbits (in the order Lagomorpha) are only found on the mainland. Bat species in the order Chiroptera are probably distributed in suitable habitats throughout the islands. Species of Insectivora and Rodentia are found on various islands, but their total distribution and the methods and frequency of dispersal between islands are not totally understood.

Klein (1965) provides an excellent summary of the postglacial mammal distribution patterns in the southern coastal regions of Alaska. The distribution of small mammals in Southeast Alaska may be accounted for with 3 hypotheses (Klein 1965):

1) Refugia (areas that were not covered by glaciers during the last ice age) existed in some offshore areas now submerged at least during the Wisconsin glaciation, as well as land connections between islands or between islands and the mainland;

TABLE 3-153
NUMBER OF SPECIES OCCURRING IN SOUTHEAST ALASKA BY SCIENTIFIC ORDER

	Number of Regular Occurring Species[1]	*Number of Occasional Occurring Species*[1]	*Number of Known/ Probable Breeders*
BIRDS			
Scientific Order:			
Gaviiformes (Loons)	4	0	2
Podicipediformes (Grebes)	4	0	0
Procellariiformes (Albatrosses, Fulmars, Petrels)	9	1	2
Pelecaniformes (Cormorants)	2	1	2
Ciconiiformes (Herons, Bitterns)	2	1	2
Anseriformes (Ducks, Geese, Swans)	36[2]	8	21
Falconiformes(Hawks, Eagles,Falcons	12	0	8
Galliformes (Grouse, Ptarmigan)	5	1	5
Gruiformes (Cranes, Coots)	3	0	2
Charadriiformes(Shorebirds, Gulls, Alcids)	55	11	25
Columbiformes (Pigeons, Doves)	3	0	2
Strigiformes (Owls)	9	2	3
Caprimulgiformes (Nighthawk)	1	1	0
Apodiformes (Swifts, Hummingbirds)	4	0	3
Coraciiformes (Kingfisher)	1	0	1
Piciformes (Woodpeckers)	6	0	5
Passeriformes (Perching Birds)	75	19	64
MAMMALS			
Scientific Order:			
Insectivora (Shrews)	4	0	4
Chiroptera (Bats)	6	0	6
Lagomorpha (Hares, Pika)	2	0	2
Rodentia (Mice, Squirrels, Voles)	21	0	21
Cetacea (Whales, Dolphins, Porpoise)	17	1	?
Carnivora (Wolf, Weasel, Bear, Otter, ect.)	15	0	15
Pinnipedia (Seals, Sea Lions)	3	1	3
Artiodactyla(Deer, Moose, Mountain Goat, Elk)	4	0	4
AMPHIBIANS AND REPTILES			
Scientific Order:			
Caudata (Newt, Salamander)	2	1	2
Anura (Toads, Frogs)	3	0	3
Squamata (Snakes)	0	1	0
Chelonia (Turtles)	0	1	0

Source: Taylor 1979

[1] Regular occurring species are those considered rare, uncommon, or common, but which occur annually in Southeast Alaska. Occasional occurring species do not occur annually in Southeast Alaska. [2] The four subspecies of Canada geese are counted as separate species.

2) The affinities of some species of small mammals occurring on widely separated islands are the result of parallel morphological changes occurring under similar environmental stimuli in postglacial times;
3) Inter-island dispersal of some species of small mammals occurred via Indian canoe in recent times.

None of these hypotheses have been tested, and we are still in need of additional data and research on the distribution of small mammals in Southeast Alaska.

The 22 species in the orders Cetacea (whales, dolphin, and porpoises) and Pinnipedia (seals and sealions) are often referred to as marine mammals. Some of these species are entirely aquatic and never use land, while other species use land for a portion of their life requirements. Eight species of whales are listed as endangered under authority of the Endangered Species Act. Information on the endangered whale species is presented in the Threatened and Endangered Species section.

The order Carnivora includes such species as the gray wolf, black bear, brown bear, marten, ermine, river otter, sea otter, and lynx. Many of these species are valuable for their furs, food and nonconsumptive viewing. Because these animals have been hunted and trapped, more is known about their distribution and abundance.

The order Artiodactyla includes three species (Sitka black-tailed deer, moose and mountain goat) which are native to Southeast Alaska, and one recently introduced species (elk). Elk were introduced on Etolin Island from a cooperative transplant effot between the Alaska Department of Fish and Game, sportsmens' groups, and the Forest Service. A few elk have now naturally dispersed from Etolin Island to Zarembo Island. These elk populations are very small, and their future viability is uncertain. Sportsmens' groups are interested in transplanting additional elk. Information on the three native species is included later in this section in the discussions on Management Indicator Species.

Birds

Birds in the orders Gaviiformes, Podicipediformes, Procellariiformes, Pelecaniformes, and Charadriiformes are often collectively known as seabirds. Many of these species use the food resources of the ocean and freshwater lakes, and nest on land. Some of these species nest in large concentrations, and are known as colonial nesters.

Species in Anseriformes, Ciconiiformes, Gruiformes, and Charadriiformes comprise the numerous ducks, geese, swans, and shorebirds which use the bays, estuaries, and wetlands. Millions of waterfowl and shorebirds migrating to and from northern Alaska and Canadian breeding grounds spend part of their migration in Southeast Alaska. Nearly the entire known population of Vancouver Canada geese breeds and remains in Southeast Alaska throughout

the year. Winter waterfowl populations vary according to the severity of winters, but the population is likely in excess of 500,000.

The order Falconiformes includes five species of hawks, four species of falcons, two species of eagles and osprey. Only four breeding pairs of osprey have been documented on the Tongass, all on the Stikine Area. The reasons for so few osprey are not known, but some believe it may be the weather conditions or competition with bald eagles. The Forest supports the largest population of bald eagles in the world. During the 1980's, the estimated adult bald eagle population has increased from 10,000 birds to 12,000 birds, accounting for about 50 percent of Alaska's bald eagle population. There are 32 known nest sites of Peale's peregrine falcon on the Forest, with most of the nests occurring on cliffs facing the ocean. Populations of other species in this order are not known, but most are considered uncommon or rare in overall abundance.

The order Strigiformes includes between nine and eleven species of owls. The great horned owl and short-eared owl are considered the most common owls. The abundance and distribution of owls in Southeast Alaska is not understood.

The order Galliformes includes the upland game birds of blue grouse, spruce grouse, willow ptarmigan, rock ptarmigan, and white-tailed ptarmigan. Blue grouse and rock ptarmigan are common, while the other species are considered uncommon or rare. All of the species are legally hunted, however, no harvest records are available.

Six species of woodpeckers are included in the order Piciformes. These species are the common flicker, red-breasted sapsucker, hairy woodpecker, downy woodpecker, black-backed three-toed woodpecker, and northern three-toed woodpecker. These species are known as "primary cavity nesters." They excavate cavities in trees for their own use. These cavities are subsequently used by "secondary cavity nesters", which are species that cannot excavate their own cavities, and, therefore use those excavated by other birds.

The remaining orders of Columbiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes contain between 84 and 104 species. These species use a wide variety of forested and non-forested habitats, and vary in abundance from common to rare. Alaska Region Report Number 82 lists these species with estimated abundance ratings (Taylor 1979).

Amphibians and Reptiles

Five amphibians are found on the Tongass National Forest, and include: rough-skinned newt, long-toed salamander, western toad, spotted frog, and wood frog. These species appear to be widely distributed throughout the islands in Southeast Alaska, and locally abundant in suitable habitat (personal communication with Forest biologists). One amphibian and two reptiles are considered peripheral species and include: Northwestern salamander, Pacific

leatherback turtle, and common gartersnake. These peripheral species are on the geographic edge of their distribution and their presence in Southeast Alaska has been recorded only a few times. Reproduction has not been documented.

Management Indicator Species

Management Indicator Species (MIS) are vertebrate or invertebrate species whose population changes are used to indicate the effects of land management activities (USDA Forest Service 1982). MIS are a planning tool to promote more effective management of wildlife and fish habitats on National Forest Lands. Through the MIS concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. MIS are used to meet the requirements of the National Forest Management Act for maintenance of population viability and biological diversity and to establish management goals for species in public demand. Population viability is the ability of a population to sustain itself naturally.

The selection of Management Indicator Species for the Tongass Forest Plan Revision was a two step process. First, the Alaska Region cooperated with the Alaska Department of Fish and Game (ADF&G), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) to identify MIS for National Forest Lands in Alaska. This step resulted in the systematic evaluation of all the species occurring on National Forest Lands in Alaska. This systematic evaluation resulted in the identification of 22 wildlife species as potential MIS for use in Regional, Forest, and project level planning. The Alaska Region Technical Publication titled "*Management Indicator Species for the National Forest Lands in Alaska*" (Sidle and Suring 1986), provides a detailed overview of this step. The 22 wildlife species included: red squirrel, beaver, long-tailed vole, gray wolf, black bear, brown bear, marten, river otter, Sitka black-tailed deer, moose, mountain goat, Vancouver Canada goose, common merganser, northern goshawk, osprey, bald eagle, blue grouse, ptarmigan, red-breasted sapsucker, hairy woodpecker, brown creeper, and orange-crowned warbler.

Second, the Revision interdisciplinary team, in conjunction with the Tongass Forest Supervisors and ADF&G, USFWS, and NMFS, further evaluated the MIS for the Revision. These evaluations resulted in the selection of 13 wildlife MIS for the Tongass Forest Plan Revision: mountain goat, Sitka black-tailed deer, river otter, marten, brown bear, black bear, gray wolf, red squirrel, Vancouver Canada goose, bald eagle, red-breasted sapsucker, hairy woodpecker, and brown creeper. Tables 3-154, 3-155 and 3-156 present a general overview of the habitats these species use on the Tongass National Forest.

TABLE 3-154
MAJOR HABITAT CATEGORIES USED BY THE MANAGEMENT INDICATOR SPECIES

Species	*Spruce/ Hemlock Forest*[1]	*Deciduous Forest or Shrub*[2]	*Alpine/ Tundra*[3]	*Grass/ Sedge Meadow*[4]	*Estuarine*[5]	*Marsh*[6]	*Stream & Beach Riverine*[7]	*Lacustrine Lakes*[8]
Red Squirrel	X	—	—	—	—	—	—	—
Black Bear	X	X	X	X	X	—	X	—
Brown Bear	X	X	X	X	X	—	X	—
Marten	X	—	—	—	—	—	X	—
River Otter	X	—	—	—	X	—	X	X
Sitka Black-tailed Deer	X	—	X	—	—	—	—	—
Mountain Goat	X	X	X	—	—	—	—	—
Gray Wolf[9]	—	—	—	—	—	—	—	—
Vancouver Canada Goose	X	—	—	X	X	X	X	X
Bald Eagle	X	—	—	—	X	—	X	X
Red-breasted Sapsucker	X	X	—	—	—	—	—	—
Hairy Woodpecker	X	—	—	—	—	—	—	—
Brown Creeper	X	—	—	—	—	—	—	X

Source: USDA Forest Service.

[1] Closed or open forests dominated by Sitka spruce, western hemlock, or a mixture of the two species.

[2] Deciduous forest or tall shrub community dominated by red alder, willow, cottonwood, or other deciduous species.

[3] Includes areas above tree line in SE Alaska.

[4] Meadows, coastal grassflats above high tide (often associated with estuarine), and all other upland habitats dominated by grasses and/or sedges.

[5] Fiord and tidal mixed estuaries and associated mudflat habitats and immediately adjacent habitats.

[6] Freshwater and saltwater marshes including tidal marshes, dominated by grasses and sedges.

[7] Freshwater rivers and streams.

[8] Freshwater lakes and ponds.

[9] Gray wolves will use all habitat categories which are utilized by their prey species.

TABLE 3-155
RELATIVE IMPORTANCE OF CONIFER SUCCESSIONAL STAGES AND OLD-GROWTH HABITATS FOR THE MANAGEMENT INDICATOR SPECIES[1]

	Early Succession	*Mid-Succession Stages*		*Old-Growth Stage >200 years*[2]			
Species & (Season)[3]	*0–25 years*	*26–150 years*	*150–200 years*	*<V.C.4*	*V.C.4*	*V.C.5*	*V.C.6+*
Red Squirrel (5)	L	L–H	H	L	M–H	M–H	M–H
Black Bear (2, 3, 4)	M	L	L	M	M–H	M–H	M–H
Brown Bear (3)	L	L	L	M–H	M–H	M–H	M–H
Marten (1)	L	L	L	L	M	H	H
River Otter (2, 3)	L	L	M	L	H	H	H
Sitka Black-tailed Deer (1)	L–M	L	L–M	L–M	M	H	H
Mountain Goat (1)	L	L	L	L	M–H	H	H
Gray Wolf (5)[4]							
Vancouver Canada Goose (2, 3)	L	L	L	H	H	H	H
Bald Eagle (2, 3)	L	L	L	L	H	H	H
Red-breasted Sapsucker (2, 3)	L	L	L	L	H	H	M
Hairy Woodpecker (1)	L	L	L	L	L	M	H
Brown Creeper (1)	L	L	L	L	L	L	H

Source: USDA Forest Service.

[1]H = Highest importance with highest population densities
M = Moderate importance with moderate population densities
L = Least importance with lowest population densities

[2]Old Growth is divided into the following types: <V.C.4 = all old growth forest lands less than 8,000 board feet per acre; includes muskeg forest. V.C.4 = old growth with 8–20,000 board feet per acre. V.C.5 = old growth with 20–30,000 board feet per acre. V.C.6+ = old growth with 30,000+ board feet per acre.

[3]Season codes are as follows: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year.

[4]Gray wolves will use habitats according to abundance and availability of prey species.

TABLE 3-156
RELATIVE IMPORTANCE OF NON-FORESTED HABITATS FOR THE MANAGEMENT INDICATOR SPECIES[1]

Species & (Season)[2]	*Ocean*	*Estuarine*	*River/ Stream*	*Lake*	*Cotton-wood*	*Red Alder*	*Avalanche Chutes*	*Muskeg*	*Alpine*	*Rocks*
Red Squirrel (5)	0	0	0	0	L	0	0	0	0	0
Black Bear (2, 3, 4)	0	H	M–H	0	L	L	M–H	L	L	0
Brown Bear (3)	0	H	M–H	0	L	L	M	L	L–M	0
Marten (1)	0	0	0	0	0	0	0	0	0	0
River Otter (2, 3)	H	H	M	M	H	0	0	L	0	0
Sitka Black-tailed Deer (1)	0	0	0	0	0	0	0	0	0	0
Mountain Goat (1)	0	0	0	0	0	0	L	0	L–M	M
Gray Wolf (5)[3]										
Vancouver Canada Goose (2, 3)	L	H	H	H	L	0	0	L	0	0
Bald Eagle (2, 3)	H	H	L–H	L–H	M	0	0	0	0	0
Red-breasted Sapsucker (2, 3)	0	0	0	0	H	L	0	0	0	0
Hairy Woodpecker (1)	0	0	0	0	L	L	0	0	0	0
Brown Creeper (1)	0	0	0	0	L	0	0	0	0	0

Source: USDA Forest Service.

[1]H = Highest importance with highest population densities
M = Moderate importance with moderate population densities
L = Least importance with lowest population densities
0 = Habitat is not used by the species.

[2]Season codes are as follows: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year.

[3]Gray wolves will use habitats according to abundance and availability of prey species.

Mountain Goat

Historically, mountain goats in Southeast Alaska were present only on the mainland. Although capable of swimming, they did not naturally disperse from the mainland to the islands. Klein (1963) cites a reference of one mountain goat being observed on Wrangell Island for several years, but a population was never naturally established. Through cooperative transplant work between the Alaska Department of Fish and Game and the USDA Forest Service, mountain goats are now present on many of the islands. Mountain goats are currently found within the following Value Comparison Units (VCU's): 1-32, 38-92, 95-123, 287-302, 311-332, 344-350, 352-356, 374, 375, 378, 384, 385, 390, 391, 393, 394, 482-506, 507-524, 526, 708-730, 734, 744-746, 754, 775-777, 778, 779, 782-823, 826-828, 833-854, 856-858 (See "No charge" Alternative map in the map packet for VCU locations by number.)

Mountain goat populations are perceived to be affected by Forest management activities. Public interest economic value is high including subsistence uses. Mountain goats represent species using cliffs, alpine and subalpine, and old-growth forest habitats. Hunted populations are sensitive to overharvest and human disturbance. The State of Alaska is responsible for the number of mountain goats allowed to be taken for harvest.

The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska, and are the habitats most likely to be affected by Forest management activities (Suring, et al. (1988). Important environmental factors affecting winter habitat suitability and capability are described by Suring, et al. (1988), and are summarized as follows:

Cliffs. Cliffs must be present for an area to be used by mountain goats. Cliffs are defined as slopes greater than 50 degrees.

Distance from Cliffs. The area of land within 0-1/4 mile of cliffs has the highest value to goats. Habitat value is lower from 1/4-1/2 mile from cliffs. There is no habitat value for areas greater than 1/2 mile from cliffs.

Location in Southeast Alaska. Habitat use by mountain goats differs between southern and northern Southeast Alaska. The dividing line between southern and northern is Frederick Sound. Non-forested alpine habitats in the northern part of the Forest have higher value than in the southern part because northern alpine habitats are blown free of snow, and are available for use.

Aspect. South aspects have the highest value, north aspects the lowest value, and east and west aspects intermediate values as habitat. Snow depths are deeper and persist longer on northern exposures. Southern aspects receive the highest amount of radiation from the sun, have the lowest snow depths, and the shortest time covered by snow.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Tall trees with large dense crowns have the highest value because they intercept the most snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduces their value as habitat.

Patch Size and Corridors. Mountain goats have not been identified as a species requiring minimum patch sizes of a particular habitat type. Their habitats consist of steep, broken terrain with a variety of habitat patch sizes and patterns. Similarly, they do not have specific vegetative corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human Disturbance and Mortality Factors. Goats which are not hunted, such as those found in several National Parks, are very tolerant to human presence. However, goat populations which are hunted are very sensitive to human presence, and poaching and overharvest may occur without carefully administered harvest regulations and enforcement which are the responsibility of the State. As human access increases, the quality and capability of the habitat declines.

Sitka Black-Tailed Deer

This subspecies occupies the northern-most extreme of black-tailed deer habitat. Sitka black-tailed deer are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia (Regelin 1979). Deer are strong swimmers, and have occupied all islands of the Alexander Archipelago, capable of supporting them except Forrester Island, (Klein 1963). On the mainland, deep snow and harsh weather conditions affect deer populations; few deer are found on the mainland from Glacier Bay National Park northward. An attempt to introduce deer to the Yakutat area was not successful. Presently, few deer can be found on the islands near Yakutat. At the present time, Sitka black-tailed deer are not found in the following Value Comparison Units (VCU's): 1-15, 18, 19, 21, 26, 28-31, 39-50, 53, 55-67, 71, 72, 76-79, 84, 91-92, 95-114, 116, 118, 119, 121-123, 352-395, 481, 488, 494, 498, 499, 500, 506, 507, 513, 515, 516, 783-790, 794-799, 801-817, 835, 837-853, 856, 867 (*note*: deer may be present in these VCU's in low numbers, especially when weather patterns produce lighter than normal winter weather; however, viable deer populations are generally not present.)

Sitka black-tailed deer populations are perceived as being affected by Forest management activities. Public interest in them is high as is their economic value. Sitka black-tailed deer are the wildlife species receiving the highest subsistence use. The State is responsible for the numbers of deer allowed to be taken for harvest. Sitka black-tailed deer represent species using lower elevation old-growth forest habitats during the winter period (winter is recognized as the limiting habitat factor for deer and numerous other species in Southeast Alaska).

The quantity and quality of winter habitat is the most limiting factor for Sitka black-tailed deer in Southeast Alaska, and the most likely to be affected by Forest management activities (Suring, et al. 1988). A deer winter habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Snow Depths/Winter Severity. Average winter severity has a direct effect on the distribution and abundance of deer. Mainland areas with high snowfall have fewer or no deer, while outer islands with less snow have higher numbers of deer. A snow depth rating, developed by ADF&G, for each VCU on the Forest, was used to describe the average winter conditions for the VCU (AMS, 1990). The rating system is defined as follows (planning records dated August 19, 1988, and February 13, 1989):

> *Low Snow* - zero days with more than 12 inches of snow on the ground, mean annual snowfall 0-20 inches.
> *Moderate Snow* - 19 days with more than 12 inches of snow on the ground, mean annual snowfall 20-80 inches.
> *Deep Snow* - 55 days with more than 12 inches of snow on the ground, mean annual snowfall 80-160 inches.
> *Extreme Snow* - more than 160 inches of snow; do not have viable deer populations.

Elevation and Aspect. Lower elevations are more valuable to deer than are higher elevations. When snow depths at higher elevations become deep, the deer migrate to lower elevations. North aspects (316 degrees to 45 degrees) have lower value as deer winter range than the other aspects. South, East and West aspects below 800 feet in elevation have the highest value for deer winter range. There is no deer winter range value above 1,200 feet on North aspects and 1,500 feet on South, East and West aspects.

Riparian Areas. Due to lack of favorable forage, Sitka spruce stands in riparian areas have low value to wintering deer. Deciduous tree stands in riparian areas have no value for wintering deer.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Old-growth forests have the highest value because they intercept snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduce their value as habitat.

Patch Size and Corridors. The effect of patch size on the habitat suitability and capability for deer in Southeast Alaska is poorly understood and not well developed at this time. As indicated in the current draft documentation for the deer model (Suring, et al. 1988), this parameter has not been addressed in

studies of deer and their habitat in Southeast Alaska. However, the interagency deer modeling task did develop a patch size relationship (planning record dated October 12, 1989; Suring, et al. 1988).

Small patches of old-growth winter habitat with resident wolves on larger islands or the mainland offer far less security from wolves. Deer winter range fragmentation into isolated islands of old growth will concentrate deer in predictable areas, reducing predator search time, which may precipitate sharp declines in deer. This hypothesis has been advanced by researchers in British Columbia and Southeast Alaska (Hebert 1982; VanBallenberghe and Hanley 1984; Smith et al. 1986). Old-growth patch sizes 1,000 acres or larger are estimated to provide optimum deer habitat. The interagency task group believes this general relationship is consistent with principles of the theory of island biogeography (Brown and Gibson 1983, Harris 1984) and supported by data on mule deer (Picton and Mackie 1980). There are no specific corridor requirements for deer. (Corridors - connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat.)

Wolf Predation. There are more deer where there are no wolves present.

Human Disturbance and Mortality Factors. Even when deer are in hunted populations, they are very tolerant of humans. Additional habitat suitability or capability reductions, resulting from human development and associated disturbance or displacement, have not been identified.

River Otter

River otters are associated with aquatic both coastal and fresh water environments and the immediately adjacent (within 100-500 feet) upland habitats throughout Southeast Alaska. Their distribution is Forest-wide in suitable habitats.

Used as a subsistence species, river otter represent species using coastal and riparian habitats. Their populations are perceived to be affected by Forest management activities. The State of Alaska is responsible for control of trapping. Public interest in them is also high, as is their economic value.

Food availability and adequate cover are two factors which affect an area's use by otter. Data on otter food availability along the coast does not exist. Therefore, cover attributes are the only habitat parameter available for measuring habitat quantity and quality along the coast. A river otter spring habitat capability model based on cover was developed by an interagency task group, and is described by Suring, et al. (1988). Important variables affecting the suitability and capability of habitats for river otter are summarized as follows:

Location/Elevation. Suitable habitat occurs along the coast or beach fringe (defined as 500 feet above mean high tide) and within riparian habitats along rivers, streams and lakes up to 1,200 feet in elevation. Riparian habitats from, 0-800 feet in elevation have higher habitat value than those 800-1,200 feet in elevation.

Vegetation. The successional stage of the forest vegetation influences the quality of habitat. Old-growth forests have the highest value because they provide canopy cover, large diameter trees and snags, and availability of burrow and den sites. Younger successional stages provide lower quality habitat. Non-forested habitats have no value for river otter.

Fish Abundance. Streams and rivers that produce anadromous and resident fish have higher value as river otter habitat; streams and rivers with no fish have no value as habitat.

Lake Size. Lakes greater than 50 acres in size provide more forage opportunities than smaller lakes, and therefore, have higher habitat value.

Patch Size and Corridors. River otter habitat use occurs in a "linear" pattern along the coast and along riparian habitats. River otters have not been identified as a species requiring minimum old-growth patch sizes. Similarly, they do not have specific vegetative corridor requirements, as they travel along the coast and riparian areas through a variety of terrain and vegetative conditions.

Human Disturbance and Mortality Factors. Often observed around boat harbors and other developments along the coast, river otters are very tolerant of human presence. Additional habitat suitability or capability reductions resulting from human disturbance or access have not been developed or documented.

[*NOTE*: The season of the year and the habitat factors which are most limiting to river otters have not been identified. Therefore, evaluating the effects of forest management activities on river otter habitats and populations is tenuous until more knowledge is obtained on the factors which currently limit river otters in Southeast Alaska.]

Marten

Historically, marten have inhabited only the mainland of Southeast Alaska. They have never dispersed naturally from the mainland to the islands. Through cooperative transplant work between the Alaska Department of Fish and Game and the USDA Forest Service, marten are now present on many of the islands. At the present time, marten are not found within the following Value Comparison Units (VCU's): 33-37, 93, 94, 124, 185, 186, 368, 455-461, 481, 507, 525, 629, 865.

Marten are another species whose populations are perceived as being affected by Forest management activities. Public interest in them is relatively high, their economic value is high, and they are used for subsistence. Marten represent species using lower elevation old-growth forest habitats during the winter period. Forest Management activities resulting in increasing access may result in the potential for overtrapping.

The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Winter habitats are also the habitats most likely to be affected by Forest management activities. A marten winter habitat capability model was developed by an Interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Location/Elevation. Due to lower snow accumulation, habitats at lower elevations have higher value for wintering marten. Coastal habitats (beach fringe) and riparian areas have the highest value for marten, followed by upland habitats below 800 feet in elevation, and habitats between 800 to 1,500 feet in elevation. There is no winter habitat value above 1,500 feet in elevation.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of cover and forage available for marten during the winter season. Old-growth forests have the highest value because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by marten. Early successional stages do not provide these habitat components and have lower habitat value.

Patch Size and Corridors. Marten have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 180 acres, and use declines with decreasing patch size; it becomes zero when patches are less than 10 acres. Patch size includes the acres of all conifer stands from older second growth through old growth. Marten also require corridors to facilitate movement and dispersal. Corridor requirements include all conifer stands from pole timber through old growth.

Human Disturbance and Mortality Factors. Timber harvest and other resource development activities require roads. Roads provide additional access for trappers which may result in increased harvests of marten. Marten are easily trapped and can be overharvested (Strickland et al. 1982), especially where trapping pressure is heavy without restrictive harvest regulations. The State of Alaska has primary responsibility for regulating harvest.

Brown Bear

Although considered the same species, *Ursus arctos horribilis*, is referred to as brown bear in coastal Alaska and grizzly bear in interior areas and the remainder

of North America. Records indicate that the current and historical distribution of brown bear in Southeast Alaska are the same. Brown bears are present on the mainland and on the islands north of Frederick Sound. They are occasionally reported on Mitkof and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. The populations on Mitkof and Wrangell Islands are not considered to be viable. Brown bear are absent in the following Value Comparison Units (VCU's): 22, 33-37, 68-92, 398-477, 479, 525, 527-707, 731-781, 864, 865, 866.

Public interest in brown bear is high. Their economic value is high, and their populations are perceived to be affected by forest management activities. They are also used as a subsistence species. Brown bear use sea level to alpine habitats and require large expanses of habitat and protection from human disturbances. On some islands in Southeast Alaska, Brown bear are present where black bear are absent. Threatened in the lower 48 States-- Brown bear are a national conservation issue. Some of the highest brown bear population densities in the world are found on the Tongass.

The late summer season has been identified as the most critical or limiting period for brown bear (Schoen, et al. 1989). During this season, the bears concentrate along low-elevation valley bottoms and coastal salmon streams. These are the same areas of highest human use and most intense resource development activities. An interagency task group developed a late summer season habitat capability model for brown bear (Schoen et al. 1989). This model identifies the following variables in describing the value of late summer season habitats:

Location/Elevation. During the late summer season, brown bears use habitats ranging from estuaries and other coastal habitats to riparian, upland and alpine habitats. Estuaries and riparian areas receive the highest use during this period and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by brown bears. The vegetation types which receive the highest use by brown bears during the late summer season receive the highest habitat values.

Fish Abundance. Streams and rivers that produce anadromous fish have the highest value for brown bears, while resident fish streams and streams with no fish have lower values.

Patch Size and Corridors. Brown bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and

patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human Disturbance and Mortality Factors. Increases in human activity in an area may result in increased direct human-induced mortality of bears. Increased bear mortality can occur through increased legal hunting activity, illegal kills, wounding loss, and defense of life or property kills (Schoen et al. 1987b). The State of Alaska is responsible for regulating hunting. Table 3-157 displays the number of known brown bear kills not associated with legal hunting seasons. From 1980 to 1987 a total of 95 kills occurred.

TABLE 3-157
NUMBER OF BROWN BEAR KILLS NOT ASSOCIATED WITH LEGAL HUNTING SEASONS.

Game Management Unit	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*
1A	-	-	-	-	-	1	-	-
1B	-	-	1	-	-	-	-	-
1C	1	-	-	1	-	1	1	-
1D	-	1	-	4	1	2	-	-
3	-	-	-	-	-	-	1	-
4	9	11	2	8	11	5	7	10
5A	3	3	-	-	4	4	1	2
Total	13	15	3	13	16	13	10	12

Source: Alaska Department of Fish and Game letter dated June 21, 1988

Black Bear

Records indicate the same historical and current distribution of black bear in Southeast Alaska. Black bear are present throughout the mainland, and on the islands south of Frederick Sound. They are not present in the following Value Comparison Units (VCU's): 22, 124-351, 507, 766-768, 796.

Subsistence is one of the uses of black bear on the Tongass. The species is of high public interest and high economic value. Its populations are perceived as being affected by forest management activities. Human activities and disturbances have also been known to affect its populations, but black bear are not as sensitive to disturbance as the brown bear. Black bear use habitats from alpine to sea level and are found on some islands where brown bear are not present.

Habitat suitability and capability have been described for spring, early summer, late summer, fall, and denning seasons (Suring et al. 1988). The season which

is most limiting for black bears has not been identified. The following variables have been identified in describing the value of habitats for black bear:

Location/Elevation. Black bears use habitats ranging from estuaries and other coastal habitats to riparian, upland, and alpine habitats. Estuarine, riparian, and coastal habitats receive the highest use by black bears and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by black bears. Generally, early forest successional stages and old growth forests provide the best forage and/or cover for black bears and receive the highest use.

Fish Abundance. Streams and rivers that produce anadromous fish have the highest value for black bears, while resident fish streams and streams with no fish have lower values.

Patch Size and Corridors. Black bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human Disturbance and Mortality Factors. Although black bears can adapt to changes in their environment caused by humans, human-related mortality often reduces total density of black bears (Hugie 1979; Pelton 1982). Increases in human activity in an area may result in increased direct human-induced mortality of bears. Increased bear mortality can also occur through increased legal hunting activity, illegal kills, wounding loss, and defense of life or property kills (Schoen et al. 1987b). The State is responsible for regulating hunting. Table 3-158 displays the number of known black bear kills not associated with legal hunting seasons. From 1980 to 1987 a total of 105 kills occurred.

TABLE 3-158
NUMBER OF BLACK BEAR KILLS NOT ASSOCIATED WITH LEGAL HUNTING SEASONS

Game Management Unit	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*
1A	-	4	-	1	6	7	3	6
1B	-	-	-	-	-	-	-	1
1C	-	4	2	1	6	5	11	16
1D	-	-	-	-	-	1	4	-
2	-	-	2	-	1	3	1	3
3	-	2	1	1	8	4	1	-
5A	-	-	-	-	-	-	-	-
Total	-	10	5	3	21	20	20	26

Source: Alaska Department of Fish and Game letter dated June 21, 1988

Gray Wolf

Records indicate that the historical and current distributions of gray wolves in Southeast Alaska are about the same. Gray wolves inhabit the mainland and the islands south of Frederick Sound. Gray wolves are not present in the following Value Comparison Units (VCU's): 22, 33-37, 124-351, 481, 507, 564-566.

Gray wolves require an adequate prey base of ungulates, beaver, and salmon, which equates to habitats capable of supporting that prey base. This species uses a wide variety of habitats where their prey are present, affecting prey populations in those habitats. Grey wolves are still hunted and trapped in Southeast Alaska. Wolves are threatened or endangered in the lower 48 states, and are a national conservation issue.

Habitat suitability and capability for gray wolves is tied directly to populations of their principal prey species. A habitat capability model was developed by an interagency task group and is described by Suring et al. (1988). This model identifies the following variables in describing the value of wolf habitat:

Prey Abundance. The assumption is made in this model that gray wolves will first select large ungulates as prey and utilize beaver as maintenance prey when ungulates are not plentiful (Mech 1970). As a minimum, 3.7 pounds per day of prey are required to maintain a gray wolf (Mech 1970). The normal amount of prey consumed by gray wolves ranges from 5.5 pounds to 13.9 pounds per day (Mech 1974).

Social Factors. Due to social interactions, wolf densities do not exceed certain levels even when prey abundance is high. Densities of 0.1 adult gray wolf per square mile are considered high (Paradiso and Nowak 1982). This density has been generally accepted as the saturation point beyond which gray wolf populations would not expand (Pimlott 1967; Mech 1970).

Patch Size and Corridors. Gray wolves have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human Disturbance and Mortality Factors. Wolves are legally harvested in Southeast Alaska. Although access and increased human activity may result in increased wolf mortality, additional reduction in habitat suitability or capability as the result of human disturbance or access have not been documented or developed for Southeast Alaska. The State of Alaska is responsible for regulating wolf harvest.

Red Squirrel

Before 1930 and 1931, red squirrels existed only on the mainland of Southeast Alaska. In 1930 and 1931 they were introduced to Baranof and Chichagof Islands as a potential prey species for the introduced marten (Burris and McKnight 1973). Today, red squirrels are currently abundant on many of the islands and the mainland. Red squirrels are not present in the following Value Comparison Units (VCU's): 527-707, 865, 866.

Red squirrel populations require stands of cone-producing trees and cavities in trees and snags. They represent a species which can do fairly well in second-growth timber stands at seed-producing age. Due to their dependence on cone-producing trees and cavities in trees and snags, populations of this species are perceived as being affected by Forest management activities.

A red squirrel habitat capability model was developed by an interagency task group, and is described by Suring et al. (1988). This model identifies the following variables in describing red squirrel habitat:

Elevation: Habitat usually does not exist for red squirrels above 2,000 feet in elevation; habitat value from 1,500 to 2,000 feet in elevation is lower than at elevations below 1,500 feet.

Vegetation: Tree species and successional stages of forest stands affect the quality of habitat for red squirrels. Spruce trees and mature to old-growth forests have the highest values for red squirrel habitat.

Patch Size and Corridors: Red squirrels have been identified as a species which show a habitat/use relationship with the size of their preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 30 acres, and use declines with decreasing patch size and approaches zero when patches are less than three acres. Patch size includes the acres of all cone-producing

conifer stands. Corridors of pole timber or older stands of trees facilitate movement and dispersal.

Human Disturbance and Mortality Factors. No documentation exists on reductions in Red squirrel habitat suitability and capability due to human access and/or disturbance.

Bald Eagle

Bald eagles are found throughout Southeast Alaska. They are primarily associated with coastal habitats and inland riparian habitats. Historical and current distributions are the same.

Endangered in the lower 48 states and a national conservation issue, some of the highest bald eagle populations in the world are found in Southeast Alaska. Their nesting habitat is primarily old-growth trees along the coast and within riparian areas. Populations of bald eagles are perceived as being affected by Forest management activities.

The adult bald eagle population has been estimated to have increased from 10,000 birds in the early 1980's to 12,000 birds in the late 1980's (USDA Forest Service Admin. Document Number 153, 1985; Jacobson 1989). Most of the data collected in Southeast Alaska has primarily been on nesting habitat. The U.S. Fish and Wildlife Service maintains locations of all identified bald eagle nests; their records have identified 7,022 nest sites as of December 1988. About 98 percent of these nest sites have been found along the coast, with the remaining two percent located along rivers and lakes. Not all of the coastline and rivers and lakes have been surveyed for bald eagle nests.

An interagency task force developed a nesting habitat capability model for bald eagles in Southeast Alaska (Suring et al. 1988). This model identifies the following variables in describing the value of nesting habitat:

Location. Coastal habitats have been identified as having the highest value for nesting bald eagles. Riparian habitats around rivers and lakes have lower value. Habitats outside the coastal and riparian areas have no value for nesting bald eagles.

Elevation. Most nest sites are located below 800 feet in elevation; above this elevation, these is little to no nesting habitat value.

Stream Class. Rivers and streams with anadromous fish (Class I streams) have higher value for nesting bald eagles than rivers and streams with resident fish (Class II streams). Streams with no fish have no value for bald eagles.

Lake Size. Lakes larger than 50 acres have higher habitat value than those less than 50 acres.

Vegetation. Spruce trees are preferred over other tree species. Mature and old-growth stands provide the large trees selected by eagles for nest sites.

Patch Size and Corridors. Bald eagles nest on almost every island size. They have not been identified as needing particular patch sizes or vegetative corridors for movement or dispersal.

Human Disturbance and Mortality Factors. Human activities around nest sites, winter roosting areas, and other bald eagle use areas may temporarily displace eagles or cause them to abandon the site. The U.S. Fish and Wildlife Service and the USDA Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region. This interagency agreement provides management standards and guidelines regulating human disturbance within identified bald eagle use areas.

Red-Breasted Sapsucker

The breeding range of the red-breasted sapsucker extends from northern Southeast Alaska through western British Columbia and into western Washington and Oregon (Howell 1952). This sapsucker is found throughout Southeast Alaska during the spring, summer and early fall seasons, and winters in the coastal portion of its breeding range as far north as Prince of Wales Island (Howell 1952; Howell 1953).

Red-breasted sapsuckers are summer residents which require old-growth forest habitats with snags. They are called primary excavators because they excavate cavities for other cavity-using wildlife species. Public interest in them relates to their use of snags and concern for availability of snags. Red-breasted sapsuckers are perceived as being affected by Forest management activities.

Since the red-breasted sapsucker is migratory, and is present throughout Southeast Alaska only during the breeding season, a breeding habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). The quantity and quality of suitable breeding habitat has been identified as the habitat most likely to be affected by Forest management activities. The task group notes however, that breeding habitat may not be the limiting factor for the specie's population, as the quantity and quality of winter habitat in other portions of its range may ultimately be the limiting factor for the population.

Quantity of snags has a direct relationship with the size of red-breasted sapsucker population in an area. Table 3-159 displays this relationship.

A Forest-wide inventory on the number of snags does not exist. Research and timber stand examinations in Southeast Alaska have identified which forest types and successional stages provide the most favorable red-breasted sapsucker nesting habitat. Suring, et al. (1988) identifies the following variables in describing the value of sapsucker breeding habitat:

Vegetation. The successional stage of the forest vegetation directly relates to the quantity, quality and long-term supply of snags. Old-growth forests provide the best snag habitat over the long term. Lower strata classes of old growth have been found to receive higher use by sapsuckers than higher strata classes. Muskeg forests generally have small diameter, widely-spaced trees that are not preferred by sapsuckers. Black cottonwood (*Populus trichocarpa*) forests may provide suitable nesting sites, and limited forage opportunities early in the year before sap is available. Due to their small tree diameters, red alder (*Alnus rubra*) forests tend to provide limited nesting sites.

TABLE 3-159
NUMBER OF SNAGS REQUIRED PER 100 FORESTED ACRES TO SUPPORT VARIOUS PERCENTAGES OF MAXIMUM RED-BREASTED SAPSUCKER POPULATIONS IN SOUTHEASTERN ALASKA [1]

Percent of Max. Population	*Number of Snags[2]*
100	160
90	144
80	128
70	112
60	96
50	80
40	64
30	48
20	32
10	16

Source: Suring 1988.
[1] Forested acres refers to all lands capable of supporting 10 percent tree cover.
[2] Soft and hard snags which are greater than or equal to 15 inches diameter at breast height, and greater than or equal to 10 feet in height.

Elevation. Lower elevations are better nesting habitat and receive greater use than higher elevations.

Patch Size and Corridors. Red-breasted sapsuckers have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 250 acres in size, and use declines with decreasing patch size and becomes zero when patches are less than five acres. Patch size includes the acres of all old-growth conifer stands and mature to old-growth black cottonwood stands.

Since sapsuckers migrate across open water and many vegetation types to get to winter and summer areas, it is not believed that they require specific vegetative corridors.

Human Disturbance and Mortality Factors. Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the red-breasted sapsucker.

Hairy Woodpecker

Associated with snags and partially dead trees for foraging and nesting, the hairy woodpecker is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring 1986).

Hairy woodpeckers are a year-round resident of Southeast Alaska who require old-growth forest habitats with snags. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species. Their winter habitat may be their most limiting. Hairy woodpecker populations are perceived as being affected by Forest management activities.

Winter roosting and foraging habitat have been suggested as the limiting factor for resident cavity-nesting birds (Raphael and White 1984; Haapanen 1965, p. 190). An interagency task group developed a winter habitat capability model for Southeast Alaska (Suring et al. 1988).

Snag quantity has a direct relationship with the potential of an area to support hairy woodpeckers. Table 3-160 displays this relationship.

A Forest-wide snag inventory does not exist. Research and timber stand examinations in Southeast Alaska have identified which forest types and successional stages provide the most favorable nesting habitat for hairy woodpeckers. Suring, et al. (1988) identify the following variables in describing the value of hairy woodpecker breeding habitat:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity, quality, and long-term supply of snags. Old-growth forests provide the best long-term snag habitat. Higher strata classes have been found to receive higher use by hairy woodpeckers than have lower strata classes.

Elevation. Lower elevations are better winter habitat and receive higher use than do higher elevations.

Patch Size and Corridors. Hairy woodpeckers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 500

acres, and use declines with decreasing patch size and becomes zero when patches are less than 10 acres. Patch size includes the acres of all old-growth conifer and late succession conifer stands. Specific vegetative corridor requirements have not been identified for the hairy woodpecker.

Human Disturbance and Mortality Factors. Reductions in habitat suitability and capability due to mortality and disturbance caused by humans have not been identified for the hairy woodpecker.

TABLE 3-160
NUMBER OF SNAGS REQUIRED PER 100 FORESTED ACRES TO SUPPORT VARIOUS PERCENTAGES OF MAXIMUM HAIRY WOODPECKER POPULATIONS IN SOUTHEASTERN ALASKA [1]

Percent of Max. Population	*Number of Snags*[2]
100	672
90	605
80	538
70	470
60	403
50	336
40	269
30	202
20	134
10	67

Source: Suring 1988.
[1] Forested acres refers to all lands capable of supporting 10 percent tree cover.
[2] Soft and hard snags which are greater than or equal to 15 inches dbh and greater than or equal to 10 feet in height.

Brown Creeper

Associated with large, old-growth trees, the brown creeper is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring 1986). This species is most dependent on high volume old growth. Old-growth dependent species are a public concern. Brown creeper populations are perceived as being affected by Forest management activities.

Winter habitat has been suggested as the limiting factor for cavity-nesting birds including the brown creeper (Raphael and White 1984; Haapanen 1965, p. 190). An interagency task group developed a winter habitat capability model for brown creepers in Southeast Alaska (Suring et al. 1988). This habitat capability model identifies the following variables in describing the value of habitats for brown creepers:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity and quality of brown creeper winter habitats.

Old-growth forests receive the highest brown creeper use. Higher strata classes have been found to receive higher use than lower strata classes.

Elevation. Lower elevations are better winter habitat and receive higher use than higher elevations.

Patch Size and Corridors. Brown creepers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 15 acres in size, and use declines with decreasing patch size and becomes zero when patches are less than one acre. Patch size includes the acres of all old-growth conifer stands equal to or greater than 20,000 board feet to the acre. Specific vegetative corridor requirements have not been identified for the brown creeper.

Human Disturbance and Mortality Factors. Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the brown creeper.

Vancouver Canada Goose

Vancouver Canada geese are distributed throughout the Alexander Archipelago of Southeast Alaska. The U.S. Fish and Wildlife Service estimates a resident population of 10,000 birds in the northern half of Southeast Alaska (Hodges and Conant, 1986). Breeding range for this bird extends from Cross Sound near Glacier Bay south to Dixon Entrance and possibly into British Columbia (Hanson 1962). This population is relatively non-migratory with only two percent of the birds that nest in Southeast Alaska migrating out of the area (Ratti and Timm 1979). The majority of the birds move only locally between nesting, brood rearing, molting, and winter concentration areas.

Vancouver Canada geese, a resident year-round waterfowl species, use wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the forest. The public has shown interest in this species which is used for subsistence. Its populations are perceived as being affected by Forest management activities.

Hanson (1962) indicated that nesting and brood rearing is probably the most limiting habitat factor. However, knowledge of year-around goose habitat requirements is very limited. Additional research and information may indicate other limiting habitat factors (such as wintering habitats). Nesting and brood rearing habitat are potentially affected by various Forest management activities. An interagency task group developed a habitat capability model for nesting and brood rearing habitat (Doyle et al. 1988). The habitat capability model identifies the following variables in describing the nesting and brood rearing habitat values.

Vegetation. Estuaries, non-forested wetlands, and certain old-growth forest types are used by Vancouver Canada geese for nesting and brood rearing. Plant associations are used to identify which old-growth forest types have the highest value.

Elevation/Location. Most nesting and brood rearing occur within 2,600 feet of uncontained river channels, lakes, and saltwater.

Patch Size and Corridors. Although Vancouver Canada geese probably respond to some minimum level of patch size, adequate information is not available to develop the patch size relationship. Vegetative corridor requirements have not been identified.

Human Disturbance and Mortality Factors. Based on the solitary nature of Vancouver Canada geese and avoidance of disturbance (Hanson 1962), proximity of roads and associated disturbance is included in the evaluation of habitat suitability and capability. Livezey (1978) observed an apparent relationship between number of geese seen and distance to roads. A weak, but significant, correlation was calculated from data presented in this report between number of geese observed per day on 19 lakes and distance classes from lake to road. Of eight lakes where two or more geese were observed per day all were greater than 660 feet from an active road.

Moose

Moose have not been designated a Management Indicator Species (MIS); however, at the request of the Alaska Department of Fish and Game, information on moose habitats and populations will be displayed as part of the Forest Plan Revision.

Moose migrated down the major river systems from Canada into Southeast Alaska during the early 20th century, and moose were first reported at Yakutat between 1930 to 1932. All moose in Southeast result from these natural migrations except those at Berner's Bay; they were transplanted there in the mid-1960's. Moose were also transplanted into the Chickamin River valley, but because suitable habitat was limited, this transplant did not result in an established herd. Moose may still be expanding their range in Southeast Alaska, with reports of moose being seen on Chichagof and Prince of Wales Islands. Given the short time they have been in Southeast, their distribution will probably increase. Currently, moose are present in the following Value Comparison Units (VCU's): 9, 12-17, 19, 20, 25, 41, 46, 55, 57, 65, 66, 68-77, 79-90, 95-123, 352-395, 428-434, 435, 436, 438, 441, 442, 445, 447-454, 463, 464, 468-471, 475-480, 482-487, 489-505, 508-524, 782, 786, 788, 790, 791, 793-796.

The Alaska Department of Fish and Game is currently preparing a "*Strategic Plan for Management of Moose in Region 1, Southeast Alaska, 1990-94*". The State of Alaska has the responsibility to control sport and subsistence hunting

of moose. In the public review of their draft strategic plan, they estimate the current post-hunt moose population for the Tongass to be 1,910 animals.

Old-Growth Forests

At the present time, timber harvesting on the Tongass primarily occurs in the old-growth forests. The harvesting of old-growth forests and the subsequent effects on wildlife habitats and populations is the dominant public issue related to wildlife on the Tongass. The old-growth forest section in Chapter 3 of the DEIS describes the current status of Tongass forests.

Roaded and Roadless Areas

Associated with timber harvesting and some other resource management activities is the development of roads and other transportation facilities. This development often allows increased human access into areas, and this access can have a detrimental effect on wildlife populations and habitats.

Table 3-161 summarizes the amount of each geozone which is currently in a roadless or roaded condition. Geozone S05 has the highest percentage of area in a roaded condition, and Geozone K06 has the highest number of roaded acres. For the Forest as a whole, 6.6 percent is currently classified as roaded, and 93.4 percent is currently classified as roadless.

Table 3-162 displays the miles of road within each geozone. There are 2,960 miles of road on the Forest as of July 1989. About 33 percent of these road miles are in locations accessible only by boat and plane. About 32 percent of the miles are currently closed. Some of these closures have been done to protect wildlife habitat values.

TABLE 3-161
ACRES OF EACH GEOZONE CLASSIFIED AS ROADLESS OR ROADED

Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded
C01	175,616	500	00	K01	128,585	1,440	01	S01	222,557	79,662	26
C02	316,758	37,449	11	K02	46,785	0	00	S02	124,065	0	00
C03	65,926	0	00	K04	427,126	60,835	12	S03	234,108	82,435	26
C04	33,490	7,538	18	K05	193,473	0	00	S04	50,074	65,208	57
C05	115,460	4,553	04	K06	442,094	257,864	37	S05	48,222	69,361	59
C06	329,501	43,218	12	K07	279,242	0	00	S06	217,372	17,681	08
C07	12,239	0	00	K08	323,471	58,315	15	S07	93,699	25,844	22
C09	272,399	22,333	08	K09	138,669	3,095	02	S08	589,698	21,770	04
C10	388,212	43,706	10	K10	102,881	40	00	S09	746,235	18,331	02
C11	126,120	0	00	K11	107,206	117,002	52	S10	268,052	19,214	07
C12	207,772	0	00	K12	107,882	0	00	S11	67,540	0	00
C13	315,736	0	00	K13	2,280,758	0	00	S12	446,299	2,404	01
C14	650,103	0	00	K14	87,567	0	00	S13	47,675	140	00
C15	952,933	11,349	01	K15	35,123	0	00	S14	27,056	16,987	39
C16	98,030	40	00								
C17	349,134	0	00								
C18	207,278	7,253	03								
C20	86,362	380	00								
C21	181,422	1,299	01								
C22	716,434	2,904	00								
C23	1,966,678	4,444	00								
C24	153,407	6,078	04								
C25	240,296	421	00								
TOTAL	7,961,306	193,465	02	TOTAL	4,700,862	498,591	10	TOTAL	3,182,652	419,037	12

Total Roadless Acres:	15,844,820
Total Roaded Acres:	1,111,093
Total Acres:	16,955,913

Source: Revision Database Q-194, November 21, 1989.

TABLE 3-162
TONGASS ROADS IN EACH GEOZONE[1]

Geozone	Arterial Miles	Collector Miles	Local Miles	F/S Hwy Miles	Total Miles	Local Closed Miles	Collector Closed Miles	Access Comments
C01	39.9	44.7	52.7	0.0	137.3	14.3	0.0	Hoonah and ferry system
C04	7.3	10.0	4.8	0.0	22.1	4.8	10.0	Boat and plane
C06	31.0	61.0	41.0	0.0	133.0	41.0	54.8	Boat and plane
C09	0.0	49.0	5.8	0.0	54.8	5.8	33.7	Boat and plane
C10	0.0	63.3	20.8	0.0	84.1	20.8	39.8	Boat and plane
C18	0.0	18.4	14.1	0.0	32.5	6.8	0.0	Boat and plane
C21	0.0	0.0	1.2	0.0	1.2	0.0	0.0	Juneau and ferry system
C22	0.0	0.0	16.2	0.7	16.9	0.0	0.0	Boat, plane, and fish camps
C24	0.0	22.7	7.7	21.2	51.6	7.7	0.0	Yakutat
C25	0.0	0.0	0.9	0.0	0.9	0.0	0.0	Boat and plane
S01	30.6	29.2	96.7	0.0	156.5	78.3	0.0	Boat and plane
S03	0.8	63.5	59.0	2.0	125.3	59.0	0.0	Kake (82.6 mi.) and boat
S04	0.0	50.5	64.4	8.4	123.3	18.1	0.0	Petersburg and ferry system
S05	0.0	54.8	49.8	0.0	104.6	39.8	0.0	Boat and plane
S06	0.0	6.3	28.3	0.0	34.6	14.8	0.0	Boat and plane
S07	0.0	44.0	22.6	0.0	66.6	0.0	0.0	Wrangell and ferry system
S08	0.0	5.8	15.6	0.0	21.4	13.8	0.0	Boat and plane
S14	0.0	0.0	13.4	0.0	13.4	13.4	0.0	Boat and plane
K01	11.3	3.6	9.7	0.0	24.6	9.7	2.3	Hyder, mainland and ferry system
K04	30.5	38.3	172.8	40.9	282.5	102.1	0.0	Ketchikan (47 mi.) and boat
K06	164.2	192.6	501.9	18.1	876.8	221.2	0.0	Prince of Wales and ferry system
K07	0.0	0.0	3.0	0.0	3.0	0.8	0.0	Prince of Wales and ferry system
K08	19.0	28.1	75.0	49.3	171.4	52.6	0.0	Prince of Wales and ferry system
K09	0.0	3.2	3.5	0.0	6.7	1.6	0.0	Boat and plane
K11	38.6	99.1	269.4	0.0	407.1	88.9	0.0	Cape Pole and Edna Bay
K13	10.4	0.0	1.1	0.0	11.5	NA	NA	Wilderness—mine access only
TOTAL	383.6	888.1	1,551.4	140.6	2,963.7	815.3	140.6	

Total accessible by towns or ferry system: 1,992.5

Total not accessible by towns or ferry system: 971.2

Source: Rob Aiken, Transportation Planner, Stikine Area.

[1] Road types (arterial, collector, local, F/S) are defined in the transportation section of the AMS. Non-permanent roads and roads which are no longer needed and are not being maintained are not included in this table.

Consumptive Use of Wildlife

Many of the wildlife species on the Tongass are important for subsistence and recreational hunting. An overview of the consumptive use of wildlife resources is presented here. Regulating consumptive use of wildlife (except for waterfowl) is the responsibility of the State of Alaska.

Sitka Black-tailed Deer. Table 3-163 summarizes deer harvests, number of hunters and hunter-days within the Tongass National Forest. The annual deer harvest has increased through the 1980's, from 5,690 deer harvested in 1980 to a high of 18,546 in 1987; representing a 226 percent increase over an eight-year period.

Deer harvests have not been evenly distributed throughout Southeast Alaska. Of the total deer harvested between 1980-88, 73 percent were harvested in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 18 percent of the deer harvest occurred in Game Management Unit 2, which includes Prince of Wales Island and adjacent islands. Only one percent of the deer harvest has occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell, and adjacent islands. About eight percent of the deer harvest has occurred on the mainland in Game Management Units 1A, 1B, and 1C.

Between 1980 and 1986, the number of deer hunters increased from 7,335 to 14,189; a 93 percent increase. The number of deer hunters declined in 1987 and 1988 to 13,813 and 12,652, respectively.

The number of hunter-days follows the same trend as the number of hunters. Between 1980 and 1986 the number of hunter-days increased from 31,380 to 67,243, a 114 percent increase. The number of hunter-days declined to 66,983 in 1987 and 49,356 in 1988.

The number of deer hunters and hunter-days have not been evenly distributed throughout Southeast Alaska. Between 1980 and 1988, a total of 55 percent of the deer hunters and hunter-days occurred in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 19 percent of the deer hunters and 23 percent of the hunter-days occurred in Game Management Unit 2, which includes Prince of Wales and adjacent islands. Twenty-two percent of the hunters and 18 percent of the hunter-days occurred in Game Management Units 1A, 1B, and 1C. Three percent of the hunters and two percent of the hunter-days occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell and adjacent islands.

TABLE 3-163
ANNUAL SITKA BLACK-TAILED DEER HARVEST (NUMBER OF DEER KILLED), NUMBER OF HUNTERS, AND HUNTER-DAYS WITHIN THE TONGASS NATIONAL FOREST FOR YEARS 1980-1988

Game Unit	Year[1] 1980	1982	1983	1984	1985	1986	1987	1988
				Annual Deer Harvest (# of animals killed)				
1A	395	340	440	530	629	801	549	671
1B	25	5	20	5	38	70	60	101
1C	245	290	400	399	527	433	485	429
2	615	1,185	1,740	1,880	3,150	2,805	3,808	2,849
3	100	75	80	130	173	201	79	223
4	4,310	5,630	8,360	8,900	10,390	10,254	13,565	11,929
Unknown	0	25	10	-[2]	111	138	-	-
Total	**5,690**	**7,550**	**11,050**	**11,844**	**15,018**	**14,702**	**18,546**	**16,202**
				Number of Hunters				
1A	1,285	1,180	1,300	1,455	1,624	1,415	1,248	1,319
1B	120	65	80	70	100	119	155	188
1C	935	1,275	955	1,075	1,315	1,129	1,140	1,009
2	735	1,296	1,725	2,180	2,658	2,929	3,278	2,760
3	240	295	285	440	471	412	379	328
	4,020	5,660	6,660	6,580	6,095	7,593	7,613	7,048
Unknown	0	70	110	300	0	592	-	-
Total	**7,335**	**9,841**	**11,115**	**12,100**	**12,263**	**14,189**	**13,813**	**12,652**
				Number of Hunter-days [3]				
1A	5,160	4,370	5,130	5,520	5,295	6,726	5,864	4,896
1B	490	260	200	430	359	561	689	590
1C	2,770	3,980	3,110	3,610	3,978	3,835	3,666	2,930
2	4,600	9,190	11,290	13,070	14,181	17,505	17,703	10,668
3	840	1,140	1,210	1,440	1,138	1,197	817	1,371
4	17,520	26,560	31,030	28,710	25,184	33,415	38,244	28,901
Unknown	0	240	580	1,750	124	4,004	-	-
Total	**31,380**	**45,740**	**52,550**	**54,530**	**50,259**	**67,243**	**66,983**	**49,356**

Source: ADF&G, letters dated June 21, 1988 and September 2, 1988. 1988 ADF&G Deer Harvest Information.
[1] Deer harvest data was not collected by the Alaska Department of Fish and Game in 1981.
[2] Years without any data (designated by a -) reflect no recorded information.
[3] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for eight hours is the equivalent of one hunter day.

Mountain Goat

Table 3-164 summarizes the annual mountain goat harvest, number of hunters, and number of hunter-days occurring within the Tongass National Forest. The annual mountain goat harvest has ranged from a high of 239 in 1981 and 1982 to a low of 140 in 1987. For the period 1980 through 1987, 30 percent of the harvest came from Game Management Unit 1A, 28 percent from Unit 4, 18 percent from Unit 1C, 15 percent from 1B, 5 percent from Unit 5A, and 3 percent from Unit 1D.

TABLE 3-164
ANNUAL MOUNTAIN GOAT HARVEST, NUMBER OF HUNTERS, AND HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS WITHIN THE TONGASS NATIONAL FOREST

Game Units	Year 1980	1981	1982	1983	1984	1985	1986	1987
	Annual Mountain Goat Harvest (# of animals killed)							
1A	59	69	77	66	53	51	51	28
1B	-	35	22	27	40	32	41	38
1C	28	31	43	42	29	35	42	31
1D [1]	3	9	10	9	5	1	7	5
4	49	75	74	60	49	41	50	36
5	5	20	13	17	4	7	5	2
Total	**144**	**239**	**239**	**221**	**180**	**167**	**196**	**140**
	Number of Hunters							
1A	128	146	154	147	141	137	122	88
1B	-	85	82	93	71	110	127	83
1C	86	90	117	101	82	83	83	98
1D [1]	77	83	41	37	90	73	59	39
4	156	225	245	218	156	147	142	137
5A	25	47	38	33	25	23	11	18
Total	**472**	**676**	**677**	**629**	**565**	**573**	**544**	**463**
	Number of Hunter-days [2]							
1A	348	453	445	469	475	445	374	311
1B	-	234	153	218	173	283	302	231
1C	237	210	299	326	218	194	225	226
1D [1]	304	229	76	73	210	157	117	111
4	401	562	677	498	378	391	309	358
5	137	160	140	97	78	72	40	98
Total	**1,427**	**1,848**	**1,790**	**1,681**	**1,532**	**1,542**	**1,367**	**1,335**

Source: Planning Record, letter dated August 18, 1988.
[1] Some of the mountain goat harvest in Unit 1D may be from non-National Forest lands.
[2] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is equivalent to one hunter day.
[3] Years without any data (designated by a -) reflect no recorded information.

The annual number of hunters has ranged from 463 to 677, and the number of hunter-days from 1,335 to 1,848. For the period 1980 through 1987, the percent of hunters and hunter-days occurring within each Game Management Unit was:

Unit	*% Hunters*	*% Hunter Days*
4	31	28
1A	23	27
1C	16	15
1D	11	10
5	5	7

Brown Bear

Table 3-165 summarizes the annual harvest of brown bears and the number of hunter-days for successful hunters within the Tongass National Forest. The annual brown bear harvest has ranged from a low of 88 in 1980 to a high of 151 in 1987. A total of 900 brown bears were harvested between 1980 and 1987. Between 1980 and 1987, 73 percent of the harvest came from Game Management Unit 4, 17 percent from Unit 5A, four percent from Unit 1C, three percent from 1B, two percent from Unit 1A.

Within Game Management Unit 4, the 1980 through 1987 brown bear harvest was distributed as follows: 41 percent occurred on Chichagof or adjacent islands, 38 percent on Admiralty or adjacent islands, and 16 percent on Baranof or adjacent islands.

Alaska Department of Fish and Game only collects data on the number of "successful" brown bear hunters. The number of successful brown bear hunters is the same as the number of brown bear harvested. The number of brown bear hunter-days is the number of hunter-days for successful hunters. No data is available for unsuccessful hunters. Between 1980 and 1987, the annual number of successful brown bear hunter-days has ranged from 391 in 1981 to 625 in 1987. From 1980 through 1987, 72 percent of the hunter-days occurred in Game Management Unit 4, 21 percent in Unit 5A, three percent in Unit 1B, and two percent in each of Units 1A and 1C.

TABLE 3-165
ANNUAL BROWN BEAR HARVEST (# OF ANIMALS KILLED) AND HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS WITHIN THE TONGASS NATIONAL FOREST

Game Unit	Year 1980	1981	1982	1983	1984	1985	1986	1987
	Annual Brown Bear Harvest (# of animals killed) [1]							
1A	1	1	2	7	3	1	2	5
1B	3	5	3	2	4	5	5	4
1C	3	1	6	4	5	6	6	3
1D	-	1	-	-	1	-	-	-
3	-	-	-	2	-	-	-	-
4	65	60	51	80	109	87	95	112
5A	16	16	20	24	17	15	15	27
Total	**88**	**84**	**82**	**119**	**139**	**114**	**123**	**151**
	Number of Hunter-days [2]							
1A	1	7	8	29	10	6	13	12
1B	12	9	6	9	17	39	27	7
1C	4	2	22	11	11	15	12	7
1D	-	2	-	-	10	-	-	-
3	-	-	-	6	-	-	-	-
4	337	289	260	360	479	375	419	458
5	98	82	107	159	95	92	98	141
Total	**452**	**391**	**403**	**574**	**622**	**527**	**569**	**625**

Source: Planning Record, letter dated June 21, 1988.
[1] Brown bear kills not attributed to legal sport and subsistence hunting are not included in this table.
[2] Hunter-days are compiled by the Alaska Department of Fish and Game: one hunter-day is equivalent to one person hunting for any length of time during a 24-hour period. Brown bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.
[3] Years without any data (designated by a -) reflect no recorded information.

Black Bear

Table 3-166 summarizes the annual harvest of black bears, and the number of hunter-days for successful hunters within the Tongass National Forest. A total of 2,891 black bears were harvested between 1980 and 1987. The annual black bear harvest has ranged from a low of 224 in 1981 to a high of 510 in 1987. For the period 1980 through 1987, 31 percent of the harvest came from Game Management Unit 2, 27 percent from Unit 3, 19 percent from Unit 1C, 12 percent from 1A, six percent from Unit 5A, four percent from Unit 1B.

The Alaska Department of Fish and Game only collects data on the number of "successful" black bear hunters. The number of successful black bear hunters is the same as the number of black bear harvested. The number of black bear hunter-days is the number of hunter-days for successful hunters. No data is available for unsuccessful hunters. For the period 1980 through 1987, the annual number of successful black bear hunter-days has ranged from 772 in 1980 to 1,655 in 1987. Between 1980 and 1987, 29 percent of the hunter-days occurred

in Game Management Unit 3, 28 percent in Unit 2, 17 percent in Unit 1C, 12 percent in Unit 5A, 11 percent in Unit 01A, and three percent in Unit 1B.

TABLE 3-166
ANNUAL BLACK BEAR HARVEST (# OF ANIMALS KILLED) AND HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS WITHIN THE TONGASS NATIONAL FOREST

Game Unit	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*
				Annual Harvest (# of animals killed) [1]				
1A	27	26	38	47	45	51	65	61
1B	10	1	9	12	17	22	19	21
1C	41	39	72	50	81	98	73	106
1D	1	4	-	-	1	-	3	1
2	86	75	114	88	123	108	157	152
3	41	65	84	82	90	122	137	153
5A	22	14	27	18	19	34	23	16
Total	**228**	**224**	**344**	**297**	**376**	**435**	**477**	**510**
				Annual Number of Hunter-Days [2]				
1A	103	72	96	159	121	169	152	158
1B	18	2	21	17	34	37	52	51
1C	121	147	180	116	231	242	211	354
1D	1	8	-	-	1	-	3	1
2	264	247	251	273	302	308	529	447
3	127	201	283	250	310	469	466	542
5A	138	95	160	86	127	202	169	102
Total	**772**	**782**	**991**	**901**	**1,126**	**1,427**	**1,582**	**1,655**

Source: Planning Record, June 21, 1988.
[1] Black bear kills not attributed to legal sport and subsistence hunting are not included in this table.
[2] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter-day is equal to one person hunting for any length of time during a 24-hour period. Black bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.
[3] Years without any data (designated by a -) reflect no recorded information.

Moose

The Alaska Department of Fish and Game is currently developing a strategic plan for management of moose in Southeast Alaska. A public review draft of the strategic plan was available during August and September 1989. The harvest data in Table 3-167 is taken from the public review draft of the "Strategic Plan for Management of Moose in Southeast Alaska."

The annual moose harvest has ranged from 204 animals in 1984 to 159 animals in 1986. The annual number of hunters has ranged from 1,146 in 1984 to 793 in 1985. The number of hunter-days has ranged from 3,950 in 1986 to 5,782 in 1984. This data includes some harvest and hunting from non-National Forest lands, primarily in the Chilkat Valley area.

TABLE 3-167
MOOSE HARVEST DATA FOR THE YEARS 1984 THROUGH 1988 [1]

Year	*No. of Hunters*	*No. of Hunter-days*	*Annual Hunter Kill*
1984	1,146	5,782	204
1985	793	4,397	172
1986	860	3,950	159
1987	964	4,172	164
1988	1,008	4,165	202

Source: ADF&G Strategic Plan for Management of Moose in Region I, Southeast Alaska, Public Review Draft, 1989)
[1] This harvest data includes non-National Forest lands, primarily in Game Management Unit 1D, in the Chilkat Valley area.

Gray Wolf

Table 3-168 summarizes the gray wolf harvest within the Tongass National Forest. The annual gray wolf harvest has ranged from a low of 63 for the 1979-80 trapping season to a high of 105 in the 1986-87 season. A total of 648 gray wolves were harvested from 1979-80 through the 1986-87 seasons. During this period, 33 percent of the harvest came from Game Management Unit 2, 25 percent from Unit 1A, 16 percent from Unit 3, 10 percent from Unit 1C, 8 percent from Unit 1B, 7 percent from Unit 5A, and 5 percent from Unit 1D.

Data is not collected for total number of trappers or number of trapper-days for wolf or any of the other furbearing (trapped) species.

Marten

Table 3-168 summarizes the marten harvest within the Tongass National Forest. The annual marten harvest has ranged from a low of 1,928 for the 1986-87 trapping season to a high of 3,468 for the 1987-88 season. A total of 11,088 marten were harvested from 1984-85 through the 1987-88 seasons. During this period, 40 percent of the harvest came from Game Management Unit 4, 28

percent from Unit 2, nine percent from Unit 1C, eight percent from Unit 3, seven percent from Unit 1A, six percent from Unit 1B, and two percent from Unit 5A.

For Game Management Unit 4, the harvest was distributed as follows: 65 percent of the harvest was from Chichagof and adjacent islands, 23 percent from Baranof and adjacent islands, and 12 percent from Admiralty and adjacent islands.

Data is not collected for total number of trappers or number of trapper-days for any of the furbearing (trapped) species.

River Otter

Table 3-168 summarizes the river otter harvest within the Tongass National Forest. The annual river otter harvest has ranged from a high of 652 for the 1979-season to a low of 373 for the 1986-87 trapping season. A total of 3,974 river otters were harvested from 1979-80 through the 1986-87 seasons. During this period, 32 percent of the harvest came from Game Management Unit 4, 29 percent from Unit 2, 14 percent from each of Units 3 and 1A, six percent from Unit 1C, four percent from Unit 1B, one percent from Unit 5A.

Data is not collected for total number of trappers or number of trapper-days for river otter or any of the other furbearing (trapped) species.

TABLE 3-168
ANNUAL HARVEST OF GRAY WOLF, MARTEN, AND RIVER OTTER WITHIN THE TONGASS NATIONAL FOREST 1/

Game Unit	*79-80*	*80-81*	*81-82*	*82-83*	*83-84*	*84-85*	*85-86*	*86-87*	*87-88*
				Gray Wolf Harvest					
1A	21	17	20	20	37	15	11	21	
1B	4	3	5	8	4	10	9	12	
1C	5	9	4	8	8	9	15	7	
1D	1	-	-	-	-	-	-	4	
2	10	37	20	17	27	42	19	39	
3	16	12	14	17	13	11	10	10	
5A	6	1	3	4	4	13	4	12	
Total	**63**	**79**	**66**	**74**	**93**	**100**	**68**	**105**	
				Marten Harvest					
1A	-	-	-	-	-	203	138	127	298
1B	-	-	-	-	-	183	83	149	270
1C	-	-	-	-	-	245	151	241	350
1D	-	-	-	-	-	9	-	-	-
2	-	-	-	-	-	1,039	589	301	1,134
3	-	-	-	-	-	272	155	110	357
4	-	-	-	-	-	1,355	1,207	962	963
5A	-	-	-	-	-	63	-	38	96
Total	**-**	**-**	**-**	**-**	**-**	**3,369**	**2,323**	**1,928**	**3,468**
				River Otter Harvest					
1A	124	63	49	54	54	65	69	63	
1B	28	33	27	22	13	14	8	9	
1C	37	34	27	24	38	29	35	31	
1D	-	2	-	-	-	-	-	-	
2	235	138	110	118	160	193	141	62	
3	54	90	76	67	46	141	51	45	
4	172	168	184	164	117	167	142	161	
5A	2	5	4	1	2	1	3	2	
Total	**652**	**533**	**477**	**450**	**430**	**610**	**449**	**373**	

Source: Planning Record dated April 8, 1988.

[1] 1987-88 harvest data for gray wolf and river otter was not available; harvest data for marten has only been collected since the 1984-85 trapping season.

Waterfowl

Table 3-169 summarizes waterfowl hunting statistics for Southeast Alaska. Waterfowl hunters, hunter-days and harvest declined during the mid-1980's. The reason for the decline is not understood.

TABLE 3-169
WATERFOWL HUNTING STATISTICS FOR SOUTHEAST ALASKA [1]

	1983	*1984*	*1985*	*1986*	*1987*	*1988*
Number of Hunters	2,446	2,114	1,840	1,655	-	-
Number of hunter-days[2]	14,433	13,533	10,148	10,130	-	-
Annual Waterfowl Harvest						
Ducks	15,928	14,251	14,806	12,810	-	-
Seaducks	-	3,217	2,082	1,322	-	-
Cranes	-	14	0	0	-	-
Snipe	-	831	1,764	44	-	-
Geese	-	1,640	2,315	1,818	-	-

Source: Alaska Department of Fish and Game

[1] Waterfowl data are for all of Southeast Alaska; data are not available for smaller geographic units.

[2] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is also the equivalent of one hunter day.

[3] Years without any data (designated by a -) reflect information not obtained.

WILDLIFE

ENVIRONMENTAL CONSEQUENCES

This section focuses potential effect each alternative may have on the habitat conditions and population trends of the Management Indicator Species (MIS). The environmental consequences are displayed in relation to the estimated amount of habitat capability which existed on the Tongass in 1954. This is done to provide a cumulative effects analysis of timber harvesting from the beginning of the two long-term timber sale contracts. The 1954 habitat capabilities were derived by recreating old-growth forest conditions in the Revision database for all land currently non-stocked due to logging, and all size class 1, 2, and 3 lands in roaded areas of the Forest. The roaded areas were used to identify which areas of the Forest had been logged since 1954. Timber harvest data suggests that most of the stands which have been logged had volumes over 30 MBF per acre. Therefore, in recreating old-growth conditions that existed in 1954, all of the logged areas were given strata class C and D old growth attributes. If regenerating logged areas had tree species identified within them, then they received the old growth attribute for that species. If no tree species was identified, then a spruce/hemlock attribute was given. Much of the regeneration in logged areas is identified as spruce; spruce regenerates easily on sites after logging. Therefore, this approach may have biased the 1954 estimate of old growth more heavily to spruce than occurred naturally.

Habitat capabilities for the wildlife management indicator species represent an estimate of the capability of various vegetation types and/or vegetation successional stages to support numbers of animals for each of the MIS. Habitat capability estimates may not be equal to actual population levels at any given point in time because populations fluctuate naturally due to a wide range of factors, such as extreme or mild winter weather, harvesting, and species interactions not accounted for in the habitat capability models.

For each alternative, changes in habitat capability are presented for the years 2000, 2040, and 2150. This time frame allows the analysis to include the effects of complete timber rotations.

Wildlife analysis was done on a geozone basis. Displays which follow show the results of the analysis for each Administrative Area and the Forest as a total. Analysis and displays are not done at a smaller scale because site-specific project information for 150 years is not available nor an accurate portrayal of the future habitat condition.

Viable Populations. NFMA implementing regulations direct that: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well-distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well-distributed so that those individuals can interact with others in the planning area" (CFR 219.19). All alternatives must comply with this direction. The following is a brief overview of the steps taken to identify viable population sizes and the distribution of those populations on the Tongass National Forest.

"Viability" is an attribute that is difficult to define in absolute numbers (Samson et al. 1985). An exact viable population number is not reasonable to calculate without a lot of detailed population dynamics information for each species; and this level of detail is not available for species in Southeast Alaska. The approach used to estimate viable populations is 50 reproductively active adults with equal sex ratio provide short-term viability, and 500 reproductively active adults with equal sex ratio provide long-term viability (Brussard 1986, Franklin 1980, Frankel and Soule 1981, Lande and Barrowclough 1986).

"Well-distributed" is also an attribute that is difficult to define. For the island situation on the Tongass National Forest, well-distributed is different for species which easily move between islands compared to species which do not have the ability to move between islands. "Well-distributed" must consider the natural distribution of species among the islands, as well as distribution patterns created by introductions of species to islands. Some islands are too small to support a viable population by themselves. The assumption used for maintaining viable populations well-distributed in the planning area is to develop units of land and/or groups of islands which would be capable of supporting viable populations, taking into account the distribution, dispersal capabilities, and the size of area needed to support a viable population.

The MIS were used for identifying viable populations and "well-distributed" criteria, recognizing that their habitats represent the habitats for other vertebrate species. The MIS habitat capability models were used to identify the amount of habitat needed to sustain the viable populations.

The viable population sizes and the "well-distributed" criteria were developed to help set the limits for all alternatives to ensure that viable populations would be well-distributed. Appendix B describes how the following viable population levels and distributions for the MIS were incorporated into the FORPLAN modeling process to ensure that that these requirements were met in all alternatives.

Mountain goat viability and distribution. Mountain goat populations can be characterized as small groups of animals scattered throughout suitable habitat within their occupied range. To maintain "well-distributed" populations within that occupied range, the following geographic units were identified: ADF&G Game Management Unit 1A (mainland), Revillagigedo Island, Cleveland Peninsula to the Stikine River, Stikine River to the Taku River, Taku River to the Chilkat River, Chilkat Mountain Range plus Glacier Bay National Park, and Baranof Island. Within each of these seven geographic units, maintain adequate habitat to support 125 animals to achieve a well-distributed population and to maintain population viability within the planning area (reference Interagency meeting records of September 26, 1988 and January 6, 1989).

Sitka black-tailed deer viability and distribution. To maintain populations "well-distributed" within the deers' occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution and dispersal of deer among the islands of Southeast Alaska. Within each of these wildlife analysis areas, maintain adequate habitat to support 500 animals to achieve a well-distributed population and to maintain population viability within the planning area (reference Interagency meeting records of September 26, 1988 and January 6, 1989). Mainland deer populations are lower and are more susceptible to severe winter weather conditions and predation. Some mainland areas do not have viable populations. Four mainland areas have viable populations of deer. These are geozones S08, S09, K05 and K12. To achieve a well-distributed population and to maintain population viability, provide adequate habitat to support 500 deer in each of Geozones S08 and S09, and 1,500 deer in Geozones K05 and K12 combined.

River otter viability and distribution. Melquist and Dronkert (1987) reviewed literature on river otter densities in North America, and reported a range of densities from one otter per 0.7 miles of coastline, to one otter per 3.6 miles of waterway, to one otter per 262 acres of coastal marsh (this last figure equates to 1 otter per 4.4 miles of coastline habitat in Southeast Alaska). Research in Southeast Alaska indicates that all river otters use coastal habitats at sometime during the year, with a portion of the populations using freshwater habitat during various seasons of the year. To achieve a well-distributed population and to maintain population viability within the planning area, maintain adequate habitat to support at least one otter per 4.4 miles of coastline within each FORPLAN geozone.

Marten viability and distribution. To maintain populations "well-distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of marten among the islands of Southeast Alaska. Within each of these wildlife analysis areas, maintain adequate habitat

to support 50 animals to achieve a well-distributed population and to maintain population viability within the planning area (reference interagency meeting records of September 26, 1988 and January 6, 1989).

Brown bear viability and distribution. Due to their population densities and large home ranges, maintaining viable populations of brown bear requires large units of land. To maintain brown bear populations well-distributed within their occupied range, eight geographic units were identified: Admiralty Island, Chichagof Island, Baranof Island, ADF&G Game Management Units 1A, 1B, 1C, 1D, and 5A (Yakutat). Within each of these geographic units, maintain adequate habitat to support the following populations to maintain population viability within the planning area: Unit 1A - 125; Unit 1B - 125; Units 1C plus 1D - 125; Unit 5A - 250; Admiralty Island - 250; Baranof Island - 250; Chichagof Island 250 (reference interagency meeting records of September 26, 1988 and January 6, 1989).

Black bear viability and distribution. Due to their population densities and large home ranges, maintaining viable populations of black bear requires large units of land. To maintain black bear populations well-distributed within their occupied range, seven geographic units were identified: ADF&G Game Management Units 1A, 1B, 1C, 1D, 2, 3 and 5A (Yakutat). Within each of these geographic units, maintain habitat to support the following populations to maintain population viability within the planning area: Unit 1A - 125; Unit 1B - 125; Units 1C plus 1D - 125; Unit 2 - 125; Unit 3 - 125, and Unit 5A - 125 (reference interagency meeting records of September 26, 1988 and January 6, 1989).

Gray wolf viability and distribution. As ungulate prey populations decline due to habitat changes or severe winters, gray wolf populations exhibit a similar decline (Van Ballenberghe et al. 1975; Van Ballenberghe and Mech 1975). It is assumed that gray wolves subsist upon beaver in Southeast Alaska when ungulate populations are at low levels. Such a situation currently exists on the northeast portion of Revillagigedo Island in southern Southeast Alaska (Smith et al. 1986b). Late winter population density of gray wolves in this area was estimated to be 0.01 per square mile. This is the lowest density of wolves considered to be a viable population within wolf occupied range on the Tongass National Forest (Suring et al. 1988; interagency meeting records of September 26, 1988 and January 6, 1989).

Red squirrel viability and distribution. Due to the high densities of red squirrels within a wide range of successional stages, it is believed that concerns for viable populations with any benchmarks or alternatives are non-existent.

Bald eagle viability and distribution. Using data from the Pacific Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service, Pacific Bald Eagle Recovery Plan, August 1986), an interagency task group recommended that the smallest

population of bald eagles which would be considered viable for Southeast Alaska would be the following: a minimum of 800 nesting pairs with an average reproductive rate of 1.0 fledged young per pair, with an average success rate per occupied site of not less than 65 percent. The group also recommended that a minimum one-half mile long by 500 foot wide old-growth beach fringe zone would need to be maintained for nest sites for each of the 800 pairs (interagency meeting records of September 26, 1988 and January 6, 1989).

To maintain the bald eagles well-distributed within their occupied range, the task group recommended that the 800 nesting pairs would need to be distributed in the same proportion as the existing nest distribution within each of the geozones (reference interagency meeting records of September 26, 1988 and January 6, 1989). However, since as much as 40 percent of the coastline has not been surveyed for existing nests, the IDT believed a more complete approach would be to distribute the 800 nesting pairs in the same proportion as the existing (1989) outputs from the habitat capability model. By this method, unsurveyed coastlines would be included.

Red-breasted sapsucker, hairy woodpecker and brown creeper viability and distribution. To maintain populations "well-distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of these species among the islands of Southeast Alaska. To maintain population viability within the planning area, maintain adequate habitat to support 50 animals within each of the wildlife analysis areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

Vancouver Canada goose viability and distribution. To maintain viable populations well-distributed throughout Southeast Alaska, eight geographic areas were recommended: Game Management Units 1A, 2, 1B combined with 3, 1C combined with Admiralty Island, 5A (Yakutat), Chichagof Island, Baranof Island, Chilkat Range combined with both 1D and Glacier Bay National Park. To maintain population viability within the planning area, maintain adequate habitat to support 125 geese within each of the eight geographic areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

Table 3-170 provides a Forest-wide comparison of the population levels needed to meet the requirements for viability as outlined above, and the estimated habitat capability (expressed in numbers of animals) for each MIS for each alternative in the year 2150. Appendix B describes how these populations were incorporated into the FORPLAN modeling process to ensure that "well distributed" requirements were achieved. Forest-wide direction and standards and guidelines for wildlife (Appendix G) give direction for providing habitat capability necessary to achieve the viable population and distribution requirements.

TABLE 3-170
FOREST-WIDE COMPARISON OF THE POPULATION LEVELS NEEDED TO MEET VIABILITY REQUIREMENTS AND THE ESTIMATED HABITAT CAPABILITY (EXPRESSED IN NUMBERS OF ANIMALS) FOR EACH MIS FOR EACH ALTERNATIVE IN THE YEAR 2150[1]

Species	Viable Population	Estimated Habitat Capability for the Year 2150						
		Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
Mountain Goat[2]	937	—	—	—	—	—	—	—
Sitka Black-tailed Deer	65,000	276,000	246,000	219,000	213,000	256,000	229,000	229,000
River Otter	2,442	6,800	6,800	5,500	5,500	6,100	5,500	5,500
Marten	8,033	21,800	19,800	18,800	18,100	20,600	19,100	19,100
Brown Bear[3]	1,351	10,000	9,900	9,900	9,900	10,300	9,800	9,900
		9,200	8,700	7,600	7,900	8,200	7,700	7,800
Black Bear[3]	750	14,000	13,300	12,600	12,300	13,400	13,000	12,800
		13,000	12,100	10,800	10,600	11,800	11,400	11,100
Gray Wolf	160	790	710	630	600	730	670	670
Bald Eagle	1,600	18,200	18,200	13,100	13,100	15,900	13,500	13,300
Red-breasted Sapsucker	8,453	895,000	795,000	765,000	736,000	855,000	775,000	785,000
Hairy Woodpecker	8,453	90,800	80,100	71,700	69,300	83,700	74,100	74,100
Brown Creeper	8,453	72,600	65,500	52,700	52,700	62,700	55,500	54,100
Vancouver Canada Goose	967	13,900	13,400	11,500	11,800	12,300	11,800	11,600

[1] Habitat capabilities for each of the MIS are described in more detail in the following pages.

[2] Habitat capability for mountain goats has not been estimated in terms of number of animals; old-growth forests have been identified as preferred winter habitat, and all alternatives will maintain between 86 and 93 percent of the productive old-growth winter range habitat which is expected to maintain populations well above viability concerns.

[3] Two habitat capabilities are presented for brown bear and black bear; the higher habitat capability is based on vegetative conditions; the lower habitat capabilities include vegetative conditions plus estimated effects due to increased human access and developments.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

The following displays the environmental consequences of each alternative for each of the Management Indicator Species.

Sitka Black-Tailed Deer

Forest-wide estimated changes in Sitka black-tailed deer winter habitat capability for each alternative are displayed in Figure 3-56. Table 3-171 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Sitka Black-tailed Deer in Southeast Alaska: Winter Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

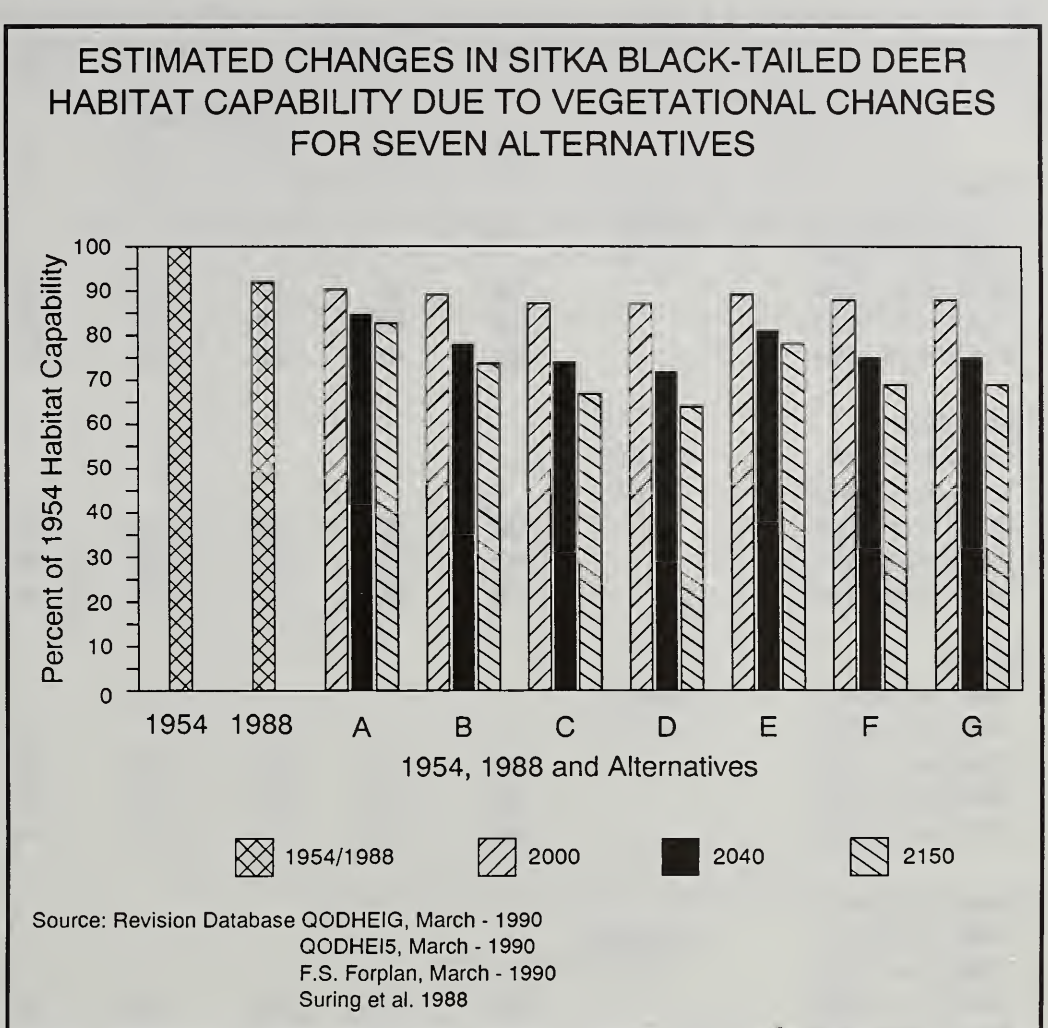
As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Alternative D with the highest allowable sale quantity has the potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest potential for allowable sale quantity has the lowest Forest-wide reduction in winter habitat capability.

On a Forest-wide basis, the 1988 winter habitat capability for deer was 92 percent of 1954 (an 8 percent reduction). In 1988 the Stikine Area was 90 percent of 1954 habitat capability, Ketchikan was 91 percent, and Chatham was 94 percent.

On a Forest-wide basis, by the year 2000, Alternative A habitat capability is 90 percent of 1954; Alternatives B, F, and G would be 88 percent of 1954; Alternative C would be 87 percent of 1954; Alternative D would be 86 percent of 1954, and Alternative E would be 89 percent of 1954.

By the year 2150, Alternative A provides for 83 percent of the 1954 habitat capability, Alternative B provides for 74 percent, Alternative C provides for 66 percent, Alternative D provides for 64 percent, Alternative E provides for 77 percent, and Alternatives F and G provide for 69 percent.

FIGURE 3-56



The estimated effects in Figure 3-56 and Table 3-171 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-57). With the Revision database, it was not possible to identify existing patch sizes for analysis, not is it feasible to predict future patch sizes which would result from project work. The old-growth patch size relationship is poorly understood and not well developed or documented for Southeast Alaska, and is currently thought to be applicable in areas of the Forest with wolves (Suring et al. 1988; Analysis of the Management Situation, Tongass National Forest, 1990).

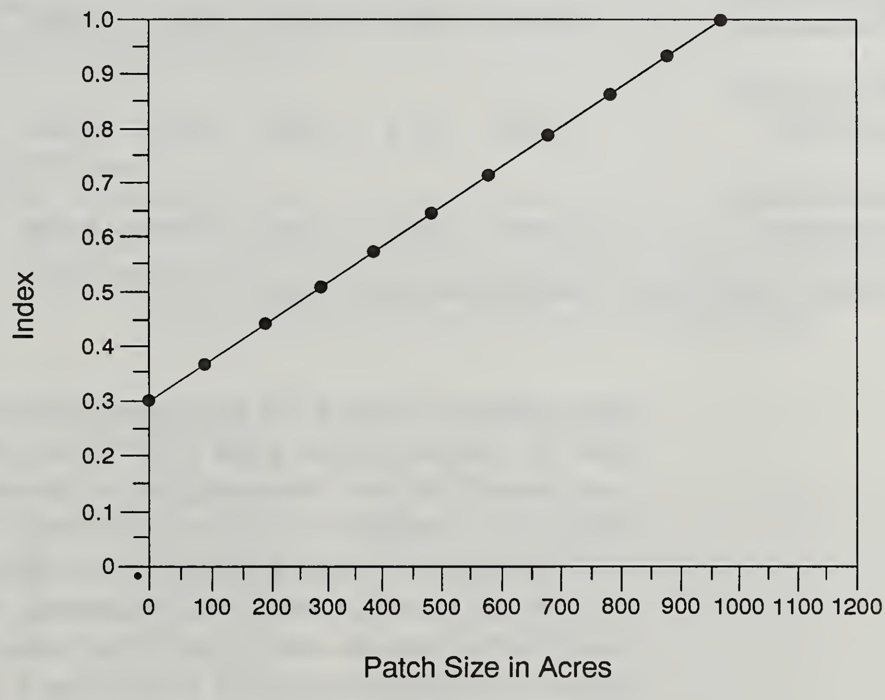
TABLE 3-171
ESTIMATED CHANGES IN SITKA BLACK-TAILED DEER WINTER HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	96,984							
1988 % of 1954	94							
2000 % of 1954		94	91	91	91	93	91	91
2040 % of 1954		93	86	87	85	93	85	85
2150 % of 1954		93	84	82	84	93	80	81
Ketchikan								
1954 Animals[1]	153,905							
1988 % of 1954	91							
2000 % of 1954		89	87	87	86	88	87	87
2040 % of 1954		82	73	67	67	76	70	70
2150 % of 1954		79	66	58	57	69	62	61
Stikine								
1954 Animals[1]	81,479							
1988 % of 1954	90							
2000 % of 1954		88	87	82	81	86	84	84
2040 % of 1954		82	79	70	64	77	73	73
2150 % of 1954		80	76	64	54	74	69	69
Tongass Total								
1954 Animals[1]	332,368							
1988 % of 1954	92							
2000 % of 1954		90	88	87	86	89	88	88
2040 % of 1954		85	78	74	72	81	75	75
2150 % of 1954		83	74	66	64	77	69	69

Source: Revision Database QODHEIG, QODHEIS, March 1990
FS FORPLAN Analysis, March 1990; Suring et al 1988.
[1] 1954 habitat capability is expressed in number of animals for winter habitat.

FIGURE 3-57

ESTIMATED EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT SITKA BLACK-TAILED DEER ON LARGER ISLANDS AND THE MAINLAND WITH RESIDENT WOLF POPULATIONS



Source: Suring et al. 1988; Modeling Task Force letter October 12, 1989

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to management prescriptions that allow considering timber harvesting. Natural old-growth patch sizes would be maintained with those areas of land allocated to management prescriptions with no scheduled timber harvest. Table 3-172 displays the amount of productive old growth within both groups of management prescriptions for each alternative. Alternative A has 73 percent of the existing productive old growth in areas with no timber harvest; Alternative B has 67 percent; Alternative C has 46 percent; Alternative D has 50 percent; Alternative E has 56 percent; Alternative F has 50 percent; and Alternative G has 49 percent.

TABLE 3-172
ACRES OF PRODUCTIVE OLD GROWTH ALLOCATED TO TWO GROUPS OF MANAGEMENT PRESCRIPTIONS, AND OLD GROWTH ACRES ESTIMATED TO BE HARVESTED BY 2150.
Acres in millions

	Alternatives						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Prod. Old Growth in No Harvest Rx's	3.757	3.456	2.371	2.601	2.878	2.594	2.523
Prod. Old Growth in Harvest Rx's	1.276	1.719	2.804	2.474	2.288	2.582	2.688
Prod. Old Growth to be Harvested	0.440	0.936	1.046	1.266	0.606	0.936	0.936

Source: Revision Database, Q200N1, Q200N2, Q200N3, March 1990.

Also displayed in Table 3-172 is the estimated amount of old growth acres that would be harvested within those areas of land allocated to management prescriptions that allow considering timber harvesting. Not all of the productive old growth is scheduled to be harvested even in the areas of land allocated to management prescriptions which allow timber harvesting after 150 years. Within the areas of land which allow timber harvesting, Alternative A would have 66 percent of the productive old growth unharvested; Alternative B would have 46 percent unharvested; Alternative C would have 63 percent unharvested; Alternative D would have 49 percent unharvested; Alternative E would have 79 percent unharvested; Alternative F would have 64 percent unharvested; and Alternative G would have 65 percent unharvested.

Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project analysis which is beyond the scope at a programmatic Forest Plan. Forest-wide Standards & Guidelines for Sitka black-tailed deer direct project-level analysis to utilize the old-growth patch size relationship as currently described by Suring, et al.

Mountain Goat

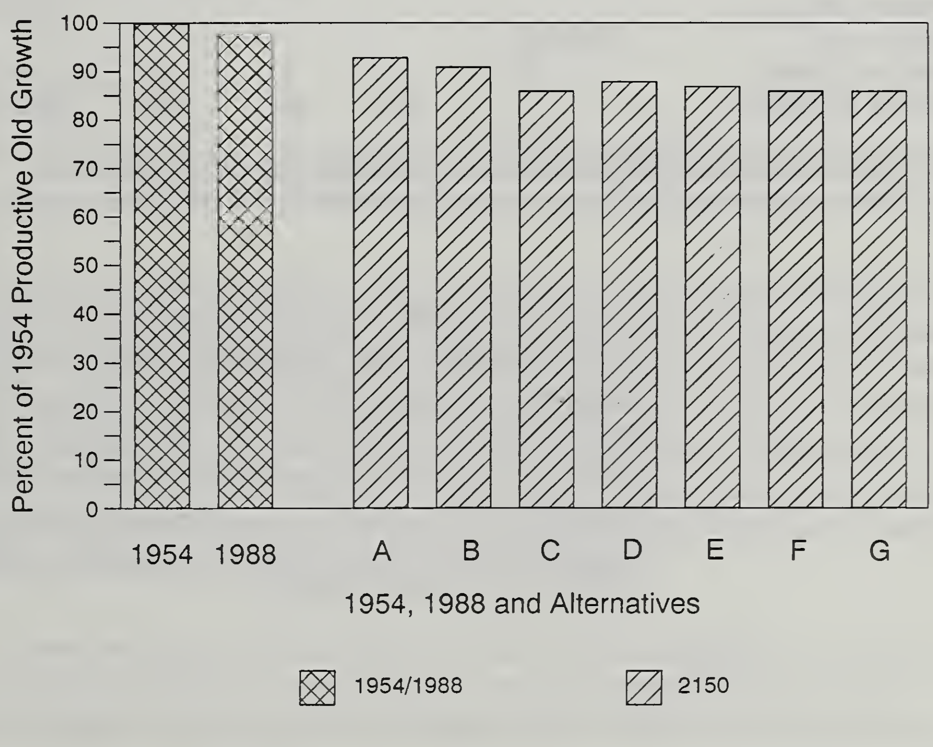
Potential changes in the amount of productive old-growth winter habitat for mountain goats is displayed in Figure 3-58. Table 3-173 displays potential changes in the amount of productive old-growth winter habitat for each of the three Administrative Areas of the Forest. Suring, et al. (1988) identifies productive old growth within 2,600 feet of cliffs within areas occupied by mountain goats as the most important winter habitat. The data in Figure 3-58 and Table 3-173 assumes that all of the productive old growth acres within 2,600 feet of cliffs

that are suitable for timber harvesting (which have been allocated to a management prescription which allows timber harvesting) will be harvested at some point in time. This is considered a potential maximum effects analysis.

On a Forest-wide basis, 98 percent of the 1954 productive old growth within 2,600 feet of cliffs within occupied goat habitat was remaining in 1988. By the year 2150, Alternative A would maintain 93 percent of the productive old growth acres, Alternative B would maintain 91 percent, Alternatives C, F, and G would maintain 86 percent, Alternative D would maintain 88 percent, and Alternative E would maintain 87 percent.

FIGURE 3-58

PERCENT OF PRODUCTIVE OLD GROWTH NOT ALLOCATED FOR POTENTIAL TIMBER HARVEST WITHIN MOUNTAIN GOAT HABITATS IN EACH ALTERNATIVE



Source: Revision Database Q200051, March - 1990
Q2000RAM05, March - 1990
Q2000RAM3, March - 1990
Q2000RAM4, March - 1990
Q2000RAM1, March - 1990

TABLE 3-173
MOUNTAIN GOAT WINTER HABITAT CONDITIONS: PERCENT OF 1954 PRODUCTIVE OLD GROWTH NOT ALLOCATED FOR POTENTIAL TIMBER HARVEST IN EACH ALTERNATIVE.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Acres [1]	110,194							
1988 % of 1954	98							
2150 % of 1954		89	87	80	82	84	81	82
Ketchikan								
1954 Acres [1]	102,415							
1988 % of 1954	100							
2150 % of 1954		98	96	93	93	93	93	93
Stikine								
1954 Acres [1]	67,337							
1988 % of 1954	95							
2150 % of 1954		92	92	84	87	84	84	84
Tongass Total								
1954 Acres [1]	279,946							
1988 % of 1954	98							
2150 % of 1954		93	91	86	88	87	86	86

Source: Revision Database Q200051, Q2000RAM05, Q2000RAM3, Q2000RAMI, March 1990
[1]1954 numbers are the acres of productive old growth within 2,600 feet of cliffs within occupied mountain goat areas.

Suring et al. (1988) estimated the effects of human development and access on winter habitats and populations (Table 3-174). They estimate that habitat capability is reduced with increasing human access and development. Reductions range from 10 to 40 percent depending on the type of development and the amount of human access. These potential additional reductions in habitat capability are dependent upon site-specific project analysis, which includes such things as road and access management, adequate regulation of hunting seasons and harvest limits, etc.

TABLE 3-174
EFFECTS OF DISTURBANCE ON THE HABITAT CAPABILITY FOR MOUNTAIN GOATS IN SOUTHEAST ALASKA

Type of Human Access or Development	*Habitat Capability Reduction (in percent)*
FS Cabin/Developed Campground/Seasonal Camp within one mile of occupied habitat	10
Permanent Camp Site/Residence/Float Camp	
within one mile of occupied habitat	40
one to five miles from occupied habitat	10
Access Point (airstrip, dock, floatplane lake) within one mile of occupied habitat	10
Road Accessible to Vehicles within two miles of occupied habitat	20
Transportation Link (ferry access/town) within two miles of occupied habitat	40
Trails or Road Access Limited to Hiking within two miles of occupied habitat	10

Source: Suring et al. 1988

Brown Bear

Forest-wide estimated changes in brown bear late summer habitat capability for each alternative are displayed in Figure 3-59. Table 3-175 displays estimated changes by the three Administrative Areas of the Forest. Figure 3-59 and Table 3-175 represent vegetational changes associated with each alternative. In making these estimates, the "Habitat Capability Model for Brown Bear in Southeast Alaska," (Schoen et al. 1989) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

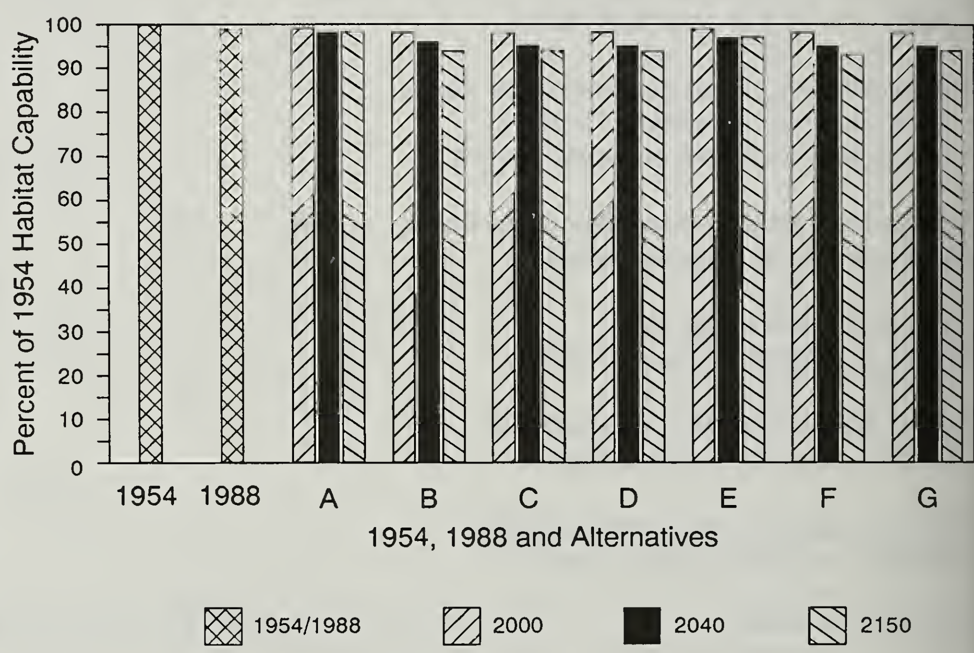
On a Forest-wide basis, the 1988 late summer habitat capability for brown bear is 99 percent of 1954. In 1988 the Stikine would be was 98 percent of 1954 habitat capability, Ketchikan was 100 percent, and Chatham was 98 percent.

On a Forest-wide basis, by the year 2000, Alternatives A and E habitat capability would be 99 percent of 1954; Alternatives B, C, D, F, and G are 98 percent of 1954.

By the year 2150, Alternative A provides for 98 percent of the 1954 habitat capability, Alternatives B, C, D, and G provide for 94 percent, Alternative E provides for 97 percent, and Alternative F provides for 93 percent.

FIGURE 3-59

ESTIMATED CHANGES IN BROWN BEAR LATE SUMMER HABITAT CAPABILITY DUE TO VEGETATIONAL CHANGES FOR SEVEN ALTERNATIVES



Source: Revision Database QURARIG, March - 1990
QURARI5, March - 1990
F.S. Forplan, March - 1990
Schoen et al. 1989

Natural resource management and development, which increases human activity in brown bear habitat, may result in increased direct human-induced mortality of bears. Schoen et al. (1989) estimated the effects of human developments and activity on habitats and populations of brown bear (Table 3-176). As access and development increases human activity into occupied brown bear habitat, there is potential for the quality and capability of the habitat to decline.

TABLE 3-175
ESTIMATED CHANGES IN BROWN BEAR LATE SUMMER HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	6,749							
1988 % of 1954	98							
2000 % of 1954		98	98	98	98	98	98	98
2040 % of 1954		98	94	95	94	98	94	95
2150 % of 1954		98	92	93	93	98	92	92
Ketchikan								
1954 Animals[1]	2,609							
1988 % of 1954	100							
2000 % of 1954		100	100	100	100	100	100	100
2040 % of 1954		100	99	99	100	100	99	100
2150 % of 1954		100	99	98	99	99	97	99
Stikine								
1954 Animals[1]	1,222							
1988 % of 1954	98							
2000 % of 1954		98	98	98	96	97	98	98
2040 % of 1954		98	96	89	90	90	90	90
2150 % of 1954		96	96	89	88	90	90	90
Tongass Total								
1954 Animals[1]	10,580							
1988 % of 1954	99							
2000 % of 1954		99	98	98	98	99	98	98
2040 % of 1954		98	96	95	95	97	95	95
2150 % of 1954		98	94	94	94	97	93	94

Source: Revision Database, Q-16, Q-15, F.S. FORPLAN Analysis, March 1990, Schoen et al 1989.
[1] 1954 habitat capability is expressed in number of animals for the late summer season.

TABLE 3-176
EFFECTS OF DEVELOPMENT AND HUMAN ACTIVITY ON THE HABITAT CAPABILITY FOR BROWN BEAR IN SOUTHEAST ALASKA

Type of Development or Activity	*Habitat Capability Reduction (in percent) within Two Influence Zones* less than one mile	one to five miles
Communities:		
Greater than 1,000 people	100	70
501-1,000 people	100	50
11-500 people	70	40
Less than 10 people	50	20
Landfill - no effective incineration	100	50
F. S. Cabin/Developed Campground	20	0
Permanent Camp Site	80	50
Temporary Camp Site	50	20
Access Point (airstrip, dock, floatplane lake)	20	0
Mainline Roads with Ferry Access or Towns	60	30
Secondary Roads with Vehicle Access	40	10
Roads Closed Administratively	20	0
Roads Closed Permanently	10	0

Source: Schoen et al. 1989.

Many of the developments and associated potential reductions in habitat capability listed in Table 3-176 would be associated with those areas allocated to management prescriptions which allow development activities. Table 3-177 displays the percent of brown bear habitat on the Forest allocated to four prescription groupings for each alternative. Intensive and moderate development within brown bear habitat ranges from 12 percent of the habitat in Alternative A to 27 percent of the habitat in Alternative C.

TABLE 3-177
PERCENT OF BROWN BEAR HABITAT ALLOCATED TO FOUR PRESCRIPTION GROUPINGS FOR EACH ALTERNATIVE

	Alternatives						
Prescription Group	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Intensive Development	2	4	13	17	10	11	12
Moderate Development	10	9	14	4	11	12	12
Natural Setting	39	45	32	36	29	35	34
Wilderness/Recommended Wilderness	50	42	42	42	50	42	42

Source: Revision Database,Q260 March 1990.

Table 3-178 displays potential changes in brown bear habitat capability due to vegetative conditions plus increased human access and development for the following developments or activities: 1) communities; 2) cabins and developed campgrounds; 3) mainline roads with ferry access or towns; 4) secondary roads with vehicle access. In calculating the road access effects, the conservative assumption was all of the National Forest lands within the intensive and moderate prescription groupings would have road access by the year 2150 (i.e. all of the acres would have a road within 1 mile by the year 2150), and none of the roads would be closed. This is considered a potential maximum effects analysis as far as roads are concerned. Although not directly accounted for, permanent camp sites and temporary camp sites would primarily be associated with the intensive and moderate prescription groupings and most of their effects would also be accounted for with the assumption used. Information on access points such as floatplane lakes, and trails were not available and are not included in Figure 3-59 and Table 3-178.

On a Forest-wide basis, estimated brown bear habitat capability resulting from vegetative conditions plus influences of towns, cabins, campgrounds, and potential maximum effects of road access was 97 percent in 1954, 95 percent in 1988, and by the year 2150 would be about 87 percent for Alternative A, 82 percent for Alternative B, 72 percent for Alternative C, 75 percent for Alternative D, 78 percent for Alternative E, 73 percent for Alternative F, and 74 percent for Alternative G.

The analysis presented in Table 3-178 does not directly include the effects of open pit garbage dumps/landfills. Some existing dumps/landfills are located on non-National Forest lands and are associated with communities. The effects of these dumps/landfills are in part indirectly accounted for with the effects of towns.

Current USDA Forest Service direction is to phase out all existing open pit garbage dumps/landfills and authorize no new ones on National Forest lands. The USDA Forest Service has been working with Alaska State agencies to phase out or require measures to reduce attracting bears at existing open pit garbage dumps/landfills.

On the Chatham Area, all of the timber operators on the area are incinerating their garbage and disposing of the ashes in a landfill in accordance with respective State Department of Environmental Conservation permits. Green's Creek mine is doing likewise. There are no open pit garbage dumps/landfills under special use permit on the Chatham Area.

TABLE 3-178

ESTIMATED CHANGES IN BROWN BEAR HABITAT CAPABILITY DUE TO VEGETATIVE CONDITIONS PLUS POTENTIAL EFFECTS OF HUMAN ACCESS AND DEVELOPMENTS

Changes in habitat capability are all based on 1954 vegetative habitat capability--i.e. 1954 vegetative habitat capability = 100 percent.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 %	97							
1988 % of 1954	93							
2150 % of 1954		85	77	66	70	77	68	68
Ketchikan								
1954 %	99							
1988 % of 1954	99							
2150 % of 1954		96	95	90	93	91	89	91
Stikine								
1954 %	97							
1988 % of 1954	92							
2150 % of 1954		81	79	60	65	61	61	61
Tongass Total								
1954 %	97							
1988 % of 1954	95							
2150 % of 1954		87	82	72	75	78	73	74

Source: Revision Database QURARI6/QURARI5, Q260, FS FORPLAN Analysis, March 1990; Schoen, et al. 1989.

On the Ketchikan Area, no open pit garbage dumps/landfills currently exist on the Tongass within brown bear habitat.

On the Stikine Area, several open pit garbage dumps/landfills may exist at logging camps and cabins within brown bear habitat. However, some of the cabins on the Stikine area have had small incinerators installed to dispose of burnable garbage.

Adverse effects on bear habitat capability from open pit garbage dumps/landfills may be less today than a few years ago due to efforts to close them and the requirements for incineration.

The adverse effects from development and human access can be reduced with appropriate management activities, such as closing roads, closing open pit dumps, requiring incineration of burnable garbage, "pack-it-in, pack-it-out" requirements for recreational users, etc. Currently, 42 percent of the roads in brown bear habitat on the Forest are closed. Direction has been developed to implement a Forest-wide program with necessary regulations to reduce or eliminate habituation of bears to human foods/garbage and reduce chances of

human/bear incidents. Specific standards and guidelines associated with this direction include:

1. Phase out and rehabilitate all existing open garbage sites on National Forest land.

2. Require incinerators and/or other bear proof garbage facilities at all camps, recreation sites, special use permits, etc.

3. Locate logging camps and other developed sites away from areas of substantial bear density to reduce chances of bear-human confrontations.

4. Maintain an aggressive public education program on bear behavior to reduce the number of human/bear incidents.

5. When necessary to reduce habituation of bears or to reduce human/bear incidents, implement special regulations requiring storage of human food in ways to make it unavailable to bears.

6. Manage roads where concentrations of brown bear occur to minimize human/bear interactions and to ensure the long-term productivity of brown bears.

Black Bear

Forest-wide estimated changes in black bear habitat capability for each alternative are displayed in Figure 3-60. Table 3-179 displays estimated changes by the three Administrative Areas of the Forest. Figure 3-60 and Table 3-179 represent vegetational changes associated with each alternative. In making these estimates, the "Habitat Capability Model for Black Bear in Southeast Alaska," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

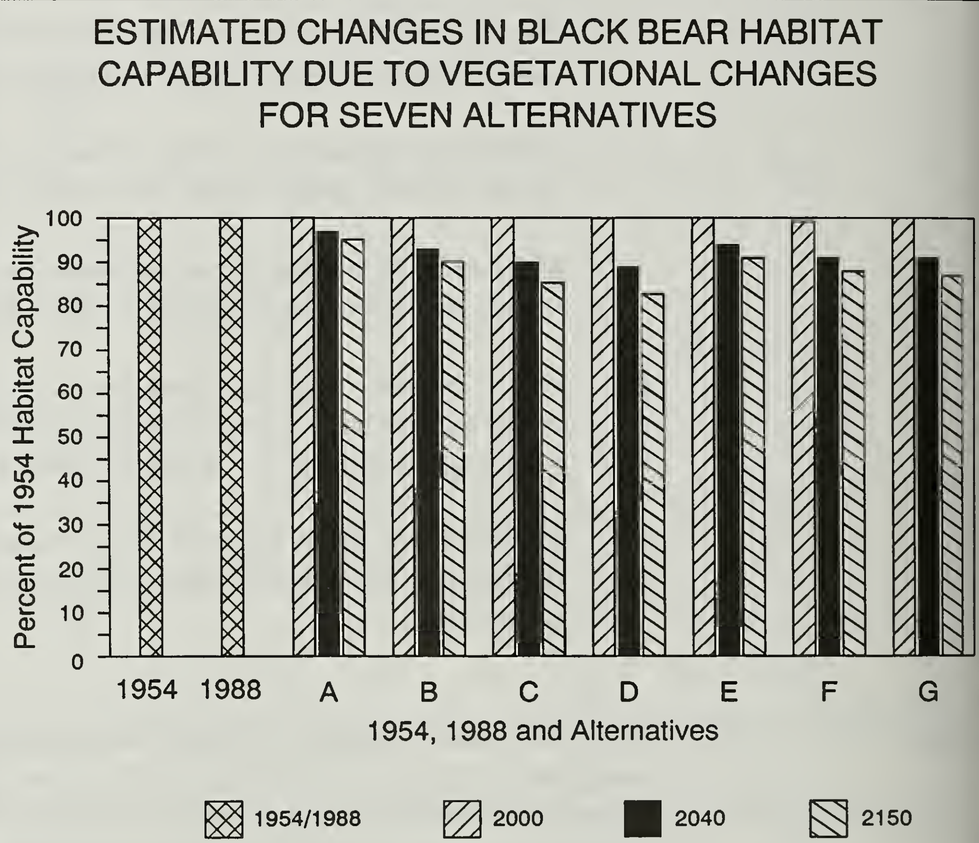
On a Forest-wide basis, the 1988 habitat capability for black bear was 100 percent of 1954. In 1988 the Stikine Area was 99 percent of 1954 habitat capability, Ketchikan was 100 percent, and Chatham was 100 percent.

On a Forest-wide basis, by the year 2000, Alternatives A, B, C, D, E, and G habitat capability would be 100 percent of 1954; Alternative F habitat capability is 99 percent of 1954.

By the year 2150, Alternative A provides for 95 percent of the 1954 habitat capability; Alternatives B provides for 90 percent; Alternative C provides for 85 percent; Alternative D provides for 83 percent; Alternative E provides for 91

percent; Alternative F provides for 88 percent; and Alternative G provides for 87 percent.

FIGURE 3-60



Source: Revision Database QURAMIG, March - 1990
QURAMI5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

TABLE 3-179
ESTIMATED CHANGES IN BLACK BEAR HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 % Animals[1]	2,714							
1988 % OF 1954	100							
2000 % OF 1954		100	100	100	100	100	100	100
2040 % OF 1954		100	95	94	97	99	93	93
2150 % OF 1954		99	90	91	92	99	93	92
Ketchikan								
1954 % Animals[1]	7,610							
1988 % OF 1954	100							
2000 % OF 1954		100	100	100	100	100	99	100
2040 % OF 1954		97	92	91	90	93	91	91
2150 % OF 1954		95	88	84	84	89	86	86
Stikine								
1954 % Animals[1]	4,453							
1988 % OF 1954	99							
2000 % OF 1954		99	99	99	99	99	99	99
2040 % OF 1954		94	94	99	84	91	89	89
2150 % OF 1954		93	92	84	77	89	87	87
Tongass Total								
1954 % Animals[1]	14,777							
1988 % OF 1954	100							
2000 % OF 1954		100	100	100	100	100	99	100
2040 % OF 1954		97	93	90	89	94	91	91
2150 % OF 1954		95	90	85	83	91	88	87

[1] 1954 habitat capability is expressed in number of animals.
Source: Revision Database, Q260, QURAMIG, QURAMI5, FS FORPLAN Analysis, March 1990; Suring, et al. 1988.

Natural resource management and development, which increases human activity in black bear habitat, may result in increased direct human-induced mortality of bears. Suring et al. (1988) estimated the effects of human developments and activity on habitats and populations of black bear (Table 3-180). As access and development increases human activity into occupied black bear habitat, there is potential for the quality and capability of the habitat to decline.

TABLE 3-180
EFFECTS OF DEVELOPMENT AND HUMAN ACTIVITY ON THE HABITAT CAPABILITY FOR BLACK BEAR IN SOUTHEAST ALASKA

	Habitat Capability Reduction (in percent) within Zones of Influence	
Type of Development or Activity	*Less than one mile*	*One to five miles*
Open-pit Garbage Dump	90	50
F. S. Cabin/Developed Campground/Seasonal Camp	10	0
Permanent Camp Site/Residence/Float Camp	40	10
Access Point (airstrip, dock, floatplane lake)	10	0
Road Accessible to Vehicles	20	(within 2 miles)
Mainline Roads with Ferry Access or Towns	20	(within 2 miles)
Accessible Road within .5 mile of Anadromous Streams	20	(within 0.5 miles)
Trails or Road Access Limited to Hiking	10	(within 2 miles)
Road Limited to Hiking/ORV's		(within .5 mile of
Anadromous Streams	10	(within 1 mile)

Source: Suring et al. 1988.

Many of the developments and associated potential reductions in habitat capability listed in Table 3-180 would be associated with those areas allocated to management prescriptions which allow development activities. Table 3-181 displays the percent of black bear habitat on the Forest allocated to four prescription groupings for each alternative. Intensive and moderate development within black bear habitat ranges from 21 percent of the habitat in Alternative A to 39 percent of the habitat in Alternative C.

TABLE 3-181
PERCENT OF BLACK BEAR HABITAT ALLOCATED TO FOUR PRESCRIPTION GROUPINGS FOR EACH ALTERNATIVE

	Alternatives						
Prescription Group	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Intensive Development	8	14	24	32	21	22	23
Moderate Development	13	10	15	4	12	14	14
Natural Setting	39	45	31	34	27	33	33
Wilderness/Recommended Wilderness	40	30	30	30	40	30	30

Source: Revision Database, Q260, March 1990.

Table 3-182 displays potential changes in black bear habitat capability due to vegetative conditions plus increased human access and development for the following developments or activities: 1) communities ; 2) cabins and developed campgrounds; 3) road access to vehicles; 4) mainline roads with ferry access or towns; 5) accessible road within .5 miles of anadromous fish streams. In calculating the road access effects, the assumption is that all National Forest lands within the intensive and moderate prescription groupings would have

road access by the year 2150 (i.e. all of the acres would have a road within 2 miles by the year 2150), and none of the roads would be closed. This is considered a potential maximum effects analysis as far as roads are concerned. Although not directly accounted for, permanent camp sites, temporary camp sites and seasonal camps would primarily be associated with the intensive and moderate prescription groupings and most of their effects will be taken into account with the assumption used. Information on access points such as floatplane lakes, and trails were not available and are not included in Table 3-182.

On a Forest-wide basis, estimated black bear habitat capability resulting from vegetative conditions plus influences of towns, cabins, campgrounds, and potential maximum effects of road access was 99 percent in 1954, 97 percent in 1988, and by the year 2150 would be 88 percent for Alternative A, 82 percent for Alternative B, 73 percent or Alternative C, 72 percent for Alternative D, 80 percent for Alternative E, 77 percent for Alternative F, and 75 percent for Alternative G.

TABLE 3-182
ESTIMATED CHANGES IN BLACK BEAR HABITAT CAPABILITY DUE TO VEGETATIVE CONDITIONS PLUS POTENTIAL EFFECTS OF HUMAN ACCESS AND DEVELOPMENTS
Changes in habitat capability are all based on 1954 vegetative habitat capability–i.e. 1954 vegetative habitat capability = 100 percent.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 %	100							
1988 % of 1954	99							
2150 % of 1954		95	85	81	84	91	84	83
Ketchikan								
1954 %	99							
1988 % of 1954	97							
2150 % of 1954		88	80	73	73	79	75	75
Stikine								
1954 %	99							
1988 % of 1954	95							
2150 % of 1954		84	81	69	63	76	72	72
Tongass Total								
1954 %	99							
1988 % of 1954	97							
2150 % of 1954		88	82	73	72	80	77	75

Source: Revision Database QURARI6/QURARI5, Q260, FS FORPLAN Analysis, March 1990; Schoen, et al. 1989.

The analysis presented in Table 3-182 does not directly include the effects of open pit garbage dumps/landfills. Some existing dumps/landfills are located on non-National Forest lands and are associated with communities. The effects of

these dumps/landfills are in part indirectly accounted for with the effects of towns.

Current National Forest Service direction is to phase out all existing landfills and authorize no new ones on National Forest lands. The Forest Service has been working with Alaska State agencies to phase out or require measures to reduce attracting bears at existing open pit garbage dumps/landfills.

On the Chatham Area, all of the timber operators on the area are incinerating their garbage and disposing of the ashes in a landfill in accordance with respective State Department of Environmental Conservation permits. Green's Creek mine is doing likewise. There are no open pit garbage dumps/landfills under special use permit on the Chatham Area.

On the Ketchikan Area, six open pit garbage dumps/landfills currently exist on National Forest lands on Prince of Wales Island. Three of the sites are considered sources of potential conflict for black bears.

On the Stikine Area, several open pit garbage dumps/landfills exist at logging camps and cabins. However, some of the cabins on the Stikine area have had small incinerators installed to dispose of burnable garbage.

Adverse effects on bear habitat capability from open pit garbage dumps/landfills may be less today than a few years ago due to efforts to close them and requirements for incineration.

The adverse effects from development and human access can be reduced with appropriate management activities, such as closing roads, closing open pit dumps, requiring incineration of burnable garbage, "pack-it-in, pack-it-out" requirements for recreational users, etc. Currently, 29 percent of the roads in black bear habitat on the Forest are closed. Direction has been developed to implement a Forest-wide program with necessary regulations to reduce or eliminate habituation of bears to human foods/garbage and reduce chances of human/bear incidents. Specific standards and guidelines associated with this direction include:

1. Phase out and rehabilitate all existing open garbage sites on National Forest land.

2. Require incinerators and/or other bear proof garbage facilities at all camps, recreation sites, special use permits, etc.

3. Locate logging camps and other developed sites away from areas of substantial bear density to reduce chances of bear-human confrontations.

4. Maintain an aggressive public education program on bear behavior to reduce the number of human/bear incidents.

5. When necessary to reduce habituation of bears or to reduce human/bear incidents, implement special regulations requiring storage of human food in ways to make it unavailable to bears.

Marten

Forest-wide estimated changes in marten winter habitat capability for each alternative are displayed in Figure 3-61. Table 3-183 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Marten in Southeast Alaska: Winter Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Alternative D with the highest allowable sale quantity has the greatest potential Forest-wide to reduce in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential Forest-wide to reduce winter habitat capability.

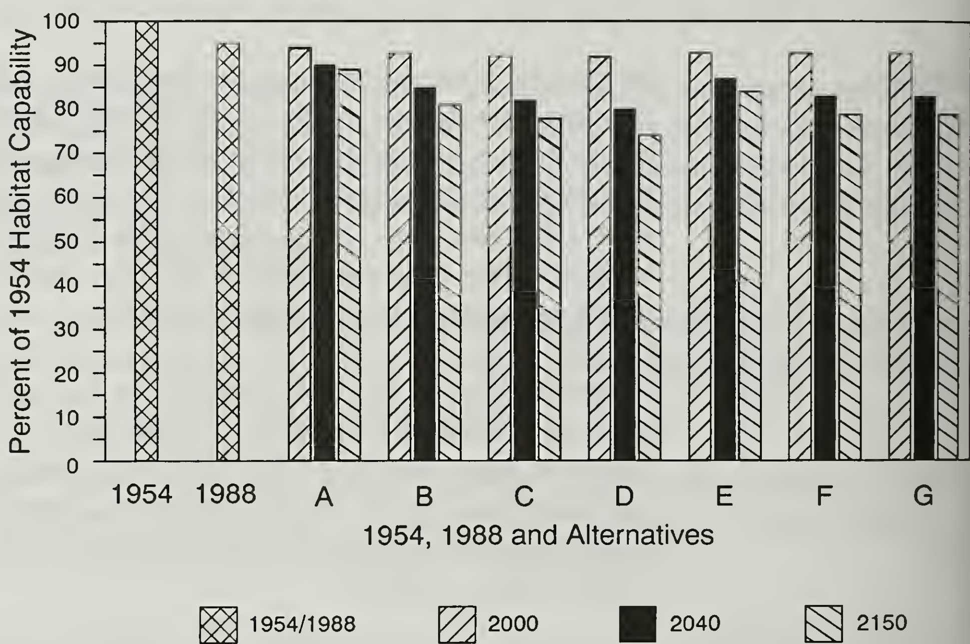
On a Forest-wide basis, the 1988 winter habitat capability for marten was 95 percent of 1954 (a 5 percent reduction). In 1988 the Stikine Area was 95 percent of 1954 habitat capability, Ketchikan was 93 percent, and Chatham was 96 percent.

On a Forest-wide basis, by the year 2000, Alternative A habitat capability would be 94 percent of 1954; Alternatives B, E, F, and G would be 93 percent of 1954; Alternatives C and D would be 92 percent of 1954.

By the year 2150, Alternative A provides for 89 percent of the 1954 habitat capability, Alternative B provides for 81 percent, Alternative C provides for 77 percent, Alternative D provides for 74 percent, Alternative E provides for 84 percent, and Alternatives F and G provide for 78 percent.

FIGURE 3-61

ESTIMATED CHANGES IN MARTEN WINTER HABITAT CAPABILITY DUE TO VEGETATIONAL CHANGES FOR SEVEN ALTERNATIVES



Source: Revision Database QMAAMIG, March - 1990
QMAAMI5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

The estimated effects in Figure 3-61 and Table 3-183 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-62). With the Revision database, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which may result from site-specific projects.

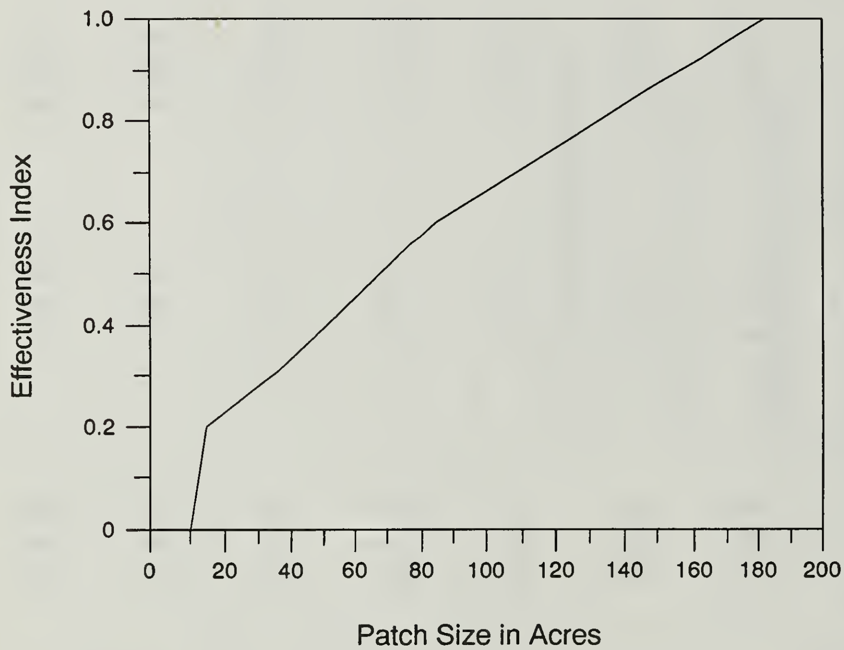
TABLE 3-183
ESTIMATED CHANGES IN MARTEN WINTER HABITAT CAPABILITY FOR EACH ALTERNATIVE DUE TO CHANGES IN VEGETATIVE CONDITIONS, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	9,373							
1988 % of 1954	96							
2000 % of 1954		96	95	95	95	96	95	95
2040 % of 1954		96	90	89	90	96	88	89
2150 % of 1954		96	87	85	86	95	84	84
Ketchikan								
1954 Animals[1]	9,537							
1988 % of 1954	93							
2000 % of 1954		91	90	90	89	91	90	90
2040 % of 1954		86	79	76	75	81	78	78
2150 % of 1954		83	74	70	68	76	71	71
Stikine								
1954 Animals[1]	5,578							
1988 % of 1954	95							
2000 % of 1954		94	94	91	90	93	93	93
2040 % of 1954		91	88	80	75	85	84	84
2150 % of 1954		87	86	75	65	83	80	80
Tongass Total								
1954 Animals[1]	24,488							
1988 % of 1954	95							
2000 % of 1954		94	93	92	92	93	93	93
2040 % of 1954		90	85	82	80	87	83	83
2150 % of 1954		89	81	77	74	84	78	78

Source: Revision Database, QMAAMIG, QMAAMI5, FS FORPLAN Analysis, March 1990; Suring et al. 1988.
[1] 1954 habitat capability is expressed in number of animals for winter habitat.

FIGURE 3-62

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT MARTEN



Source: Suring et al. 1988

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to management prescriptions that allow considering timber harvest. Natural old-growth patch sizes would be maintained with those areas of land allocated to management prescriptions with "no scheduled timber harvest." Table 3-184 displays the amount of productive old growth within both groups of management prescriptions for each alternative. Alternative A has 73 percent of the existing productive old growth in areas with no timber harvest; Alternative B has 67 percent; Alternative C has 46 percent; Alternative D has 50 percent; Alternative E has 56 percent; Alternative F has 50 percent; and Alternative G has 49 percent.

TABLE 3-184
ACRES OF PRODUCTIVE OLD GROWTH ALLOCATED TO TWO GROUPS OF MANAGEMENT PRESCRIPTIONS, AND OLD GROWTH ACRES ESTIMATED TO BE HARVESTED BY 2150.
Millions of Acres

	Alternatives						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Prod. Old Growth in No Harvest Rx's	3.757	3.456	2.371	2.601	2.878	2.594	2.523
Prod. Old Growth in Harvest Rx's	1.276	1.719	2.804	2.474	2.288	2.582	2.688
Prod. Old Growth to be Harvested	0.440	0.936	1.046	1.266	0.606	0.936	0.936

Source: Revision Database, Q200N1, Q200N2, Q200N3, March 1990.

Also displayed in Table 3-184 is the estimated amount of old growth acres to be harvested within those areas of land allocated to management prescriptions that allow considering timber harvesting. Not all of the productive old growth is scheduled to be harvested even in the areas of land allocated to management prescriptions which allow timber harvesting. Within the areas of land which allow timber harvesting, Alternative A would have 66 percent of the productive old growth unharvested; Alternative B would have 46 percent unharvested; Alternative C would have 63 percent unharvested; Alternative D would have 49 percent unharvested; Alternative E would have 79 percent unharvested; Alternative F would have 64 percent unharvested; and Alternative G would have 65 percent unharvested.

Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project analysis which is not appropriate at the programmatic Forest Plan level. Forest-wide Standards & Guidelines direct project-level analysis to utilize the old-growth patch size relationship as currently described by Suring, et al.

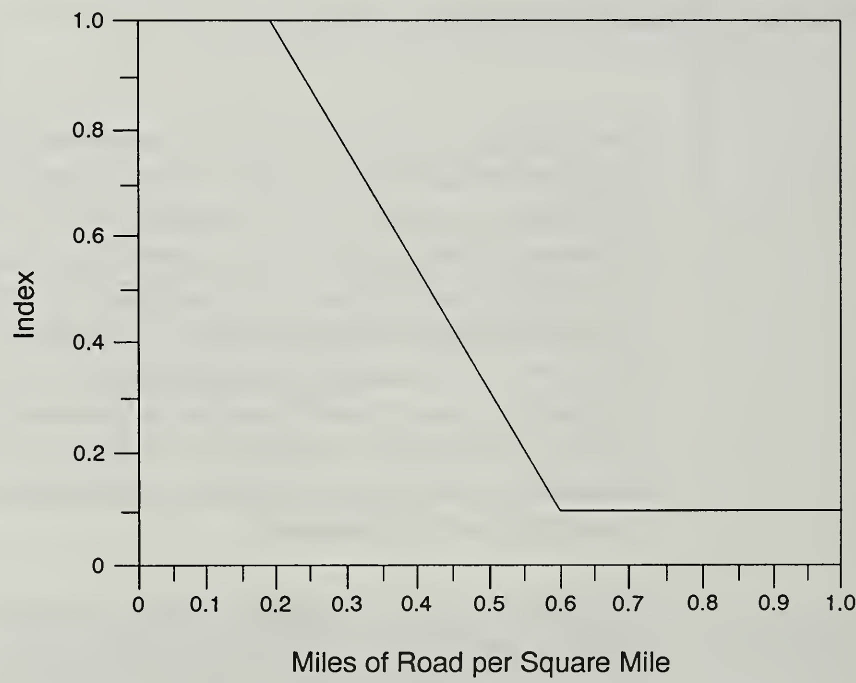
Timber harvest and other resource development activities require the construction of roads. Roads provide additional access for trappers which may result in increased trapping of marten. Marten are easily trapped and can be overharvested especially where trapping pressure is heavy (Strickland et al. 1982).

An Interagency task group developed a hypothetical curve to display the potential effect of road density on overharvesting and the ability of habitats to support marten populations (Figure 3-63). This curve was applied to the marten habitat capability data and road density data for northern Prince of Wales Island; the results from applying the curve resulted in habitat capability being less than

the number of marten currently being trapped (ref. 16 November 1989 Interagency meeting notes). More documentation and analysis is needed to verify this relationship. Regulating trapping seasons to prevent overharvesting has been the responsibility of the State of Alaska.

FIGURE 3-63

HYPOTHETICAL EFFECT OF ROAD DENSITY ON THE CAPABILITY OF HABITATS TO SUPPORT MARTEN WITHOUT ADEQUATE SAFEGUARDS TO PREVENT OVERHARVESTING



Source: Suring et al. 1988

Not all of the roads will be open and available for public access all of the time. Many of the roads will be in locations where the only access to them is by boat or plane. Roads and access can be managed to reduce human presence when necessary to help maintain populations. Standards & guidelines provide the following direction: Cooperate with the State in regulating vehicle, boat, and other human use as necessary to achieve wildlife objectives, recognizing the access provisions of ANILCA. Emphasis for reducing human disturbance will be given to high value habitat areas and during critical periods of wildlife use. If the need to restrict access is identified during project interdisciplinary review, roads will be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.

River Otter

Forest-wide estimated changes in river otter spring/early summer habitat capability for each alternative are displayed in Figure 3-64. Table 3-185 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for River Otter in Southeast Alaska: Spring Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting within beach fringe and riparian areas and reductions in winter habitat capability. Alternatives C and D with the highest allowable sale quantity in the beach fringe would have the greatest Forest-wide reduction in habitat capability, while Alternatives A and B with no timber harvest scheduled in the beach fringe have the lowest Forest-wide reduction in habitat capability. The FORPLAN model did not schedule any timber harvest from riparian areas in any alternatives except B; in Alternative B, a minor amount of timber harvest was scheduled from riparian areas (five million board feet per year). This amount of harvest from riparian areas would be equivalent to about 166 acres of clearcutting per year; this would then amount to a 2,000-year timber rotation within the riparian areas which does not produce a measurable effect on river otter habitat. Although FORPLAN did not schedule timber harvesting within riparian areas, timber harvesting could be considered during project-level analysis following standards & guidelines appropriate to riparian areas. Tables 3-22 and 3-23 in the Fish section provide additional information on potential timber harvest in riparian areas. Site-specific analysis will be needed to measure effects on river otter habitat capability in these instances.

River otter habitat capability for 1954, 1988 and all alternatives in the out decades underestimate the total habitat capability on the Tongass because the Wilderness areas did not have riparian area data in the Forest-wide database; the result is that habitat capability will be underestimated for those areas. For 1988 habitat capability, riparian buffers which have been maintained along rivers and streams in areas which have been roaded and logged are not "picked-up" very well in the database. These riparian buffers help maintain habitat capability for river otters, and when they are not picked up in the GIS database, the result is an underestimate of habitat capability and an overestimate of effects due to logging activity for 1988.

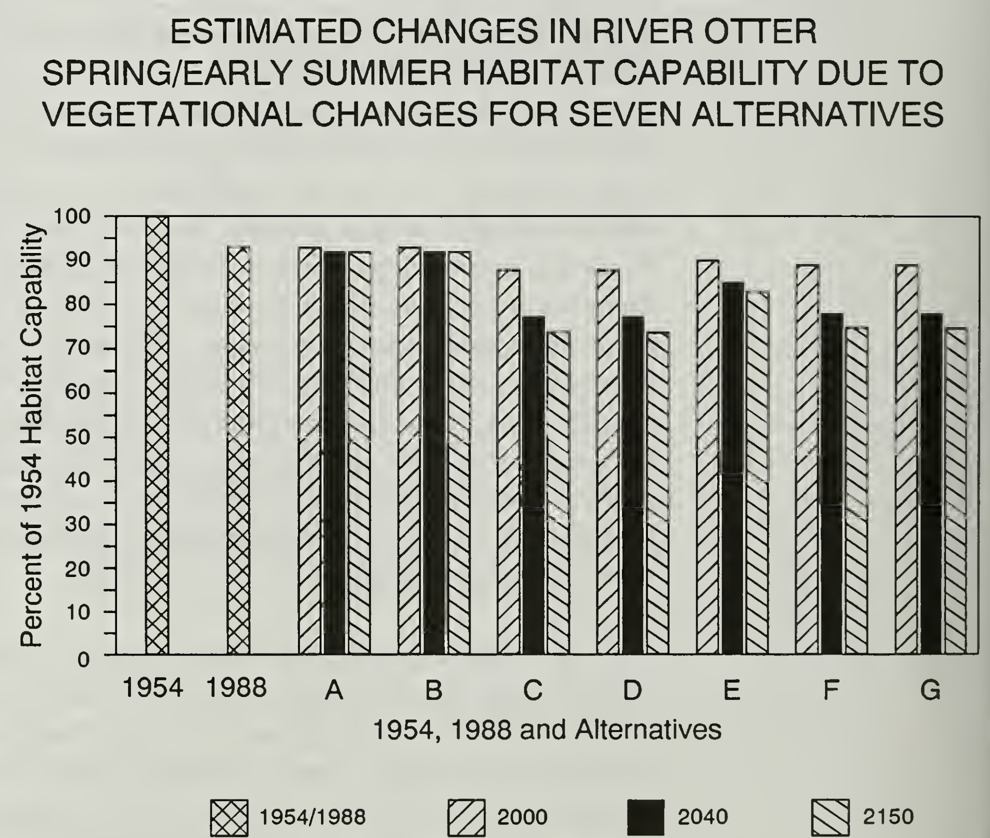
On a Forest-wide basis, the 1988 habitat capability for river otters was 93 percent of 1954. In 1988 the Stikine Area was 93 percent of 1954 habitat capability, Ketchikan was 93 percent, and Chatham was 92 percent.

On a Forest-wide basis, by the year 2000, Alternative A and B habitat capability would be 93 percent of 1954; Alternative C and D habitat capability would be

88 percent of 1954; Alternative E would be 90 percent of 1954; Alternatives F and G would be 89 percent of 1954.

By the year 2150, Alternatives A and B provide for 92 percent of the 1954 habitat capability, Alternatives C and D provide for 74 percent, Alternative E provides for 83 percent, Alternatives F and G provide for 75 percent.

FIGURE 3-64



Source: Revision Database QLUCAIG, March - 1990
QLUCAI5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

TABLE 3-185
ESTIMATED CHANGES IN RIVER OTTER SPRING/EARLY SUMMER HABITAT CAPABILITY FOR EACH ALTERNATIVE DUE TO CHANGES IN VEGETATIVE CONDITIONS, COMPARED TO 1954.

		Alternatives						
		A	B	C	D	E	F	G
Chatham								
1954 Animals[1]	2,782							
1988 % of 1954	92							
2000 % of 1954		92	90	90	90	92	90	90
2040 % of 1954		91	84	84	84	91	82	82
2150 % of 1954		91	83	82	83	91	80	80
Ketchikan								
1954 Animals[1]	2,634							
1988 % of 1954	93							
2000 % of 1954		92	91	91	91	91	90	90
2040 % of 1954		89	83	75	76	83	78	78
2150 % of 1954		88	81	70	72	78	73	72
Stikine								
1954 Animals[1]	1,970							
1988 % of 1954	93							
2000 % of 1954		91	89	82	79	87	85	85
2040 % of 1954		87	84	70	69	78	73	73
2150 % of 1954		86	83	67	64	78	72	72
Tongass Total								
1954 Animals[1]	7,386							
1988 % of 1954	93							
2000 % of 1954		93	93	88	88	90	89	89
2040 % of 1954		92	92	77	77	85	78	78
2150 % of 1954		92	92	74	74	83	75	75

Source: Revision Database QLUCAI6, QLUCAI5, F.S. FORPLAN Analysis, March 1990; Suring, et al.
[1] 1954 habitat capability is expressed in number of animals for spring/early summer habitat.

Red Squirrel

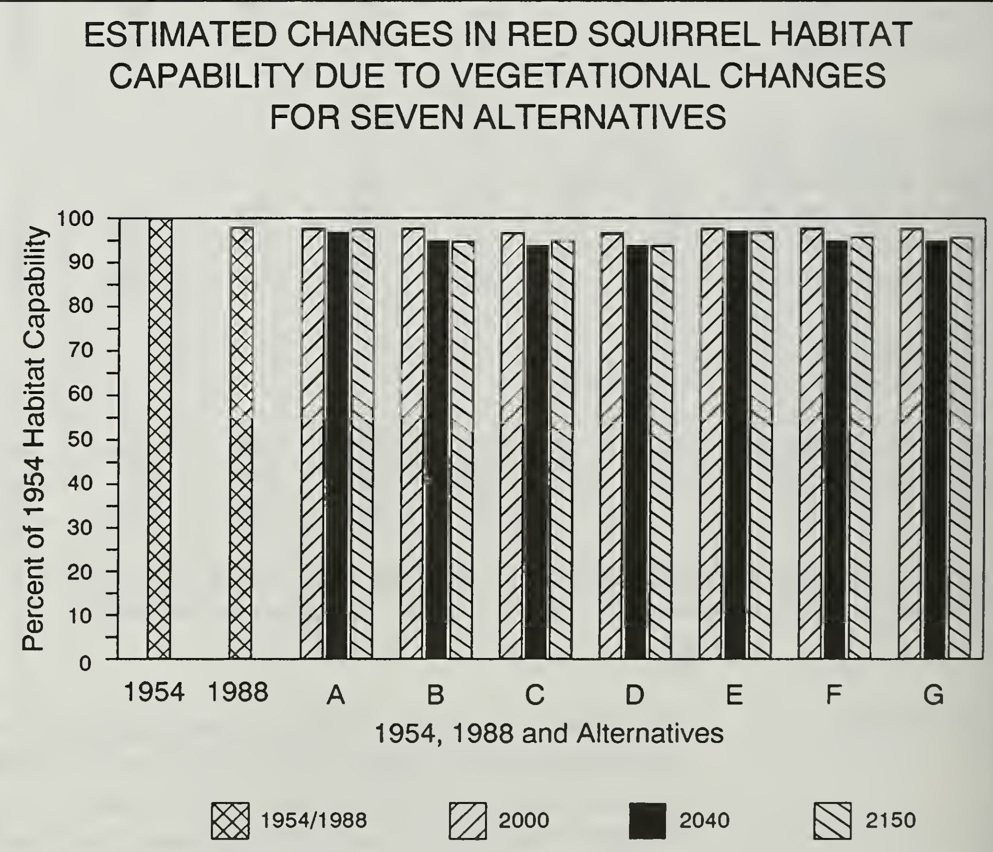
Forest-wide estimated changes in red squirrel habitat capability for each alternative are displayed in Figure 3-65. Table 3-186 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Red Squirrels Southeast Alaska," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

On a Forest-wide basis, the 1988 habitat capability for red squirrels was 98 percent of 1954. In 1988 the Stikine Area was 97 percent of 1954 habitat capability, Ketchikan was 99 percent, and Chatham was 99 percent.

On a Forest-wide basis, by the year 2000, Alternatives A, B, E, F, and G would have habitat capabilities at 98 percent of 1954; Alternatives C and D would be 97 percent.

By the year 2150, Alternative A provides for 98 percent of the 1954 habitat capability, Alternative B and C provide for 95 percent, Alternative D provides for 94 percent, Alternative E provides for 97 percent, and Alternative F and G provide for 96 percent.

FIGURE 3-65



Source: Revision Database QTAHUOG, March - 1990
QTAHUO5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

TABLE 3-186
ESTIMATED CHANGES IN RED SQUIRREL HABITAT CAPABILITY FOR EACH ALTERNATIVE DUE TO CHANGES IN VEGETATIVE CONDITIONS, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	3,425,472							
1988 % of 1954	99							
2000 % of 1954		99	98	98	98	99	98	98
2040 % of 1954		99	95	95	96	99	95	95
2150 % of 1954		99	96	96	96	99	96	96
Ketchikan								
1954 Animals[1]	1,414,360							
1988 % of 1954	99							
2000 % of 1954		99	99	99	99	99	99	99
2040 % of 1954		99	97	99	98	99	99	99
2150 % of 1954		99	97	99	98	99	99	99
Stikine								
1954 Animals[1]	1,739,436							
1988 % of 1954	97							
2000 % of 1954		95	95	94	92	95	94	94
2040 % of 1954		92	91	86	82	89	88	88
2150 % of 1954		94	92	88	83	92	90	90
Tongass Total								
1954 Animals[1]	6,579,268							
1988 % of 1954	98							
2000 % of 1954		98	98	97	97	98	98	98
2040 % of 1954		97	95	94	94	97	95	95
2150 % of 1954		98	95	95	94	97	96	96

Source: Revision Database, QTAHUOG, QTAHU05, FS FORPLAN Analysis, March 1990; Suring et al, 1988.
[1] 1954 habitat capability is expressed in number of animals habitat.

The estimated effects in Figure 3-65 and Table 3-186 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-66). With the Revision database, it was not possible to identify patch sizes for analysis. It is not expected that a large amount of patch sizes will be less than the 30 acre optimum size in any alternative; therefore, additional reductions in habitat capability due to small patch sizes are expected to be very small.

FIGURE 3-66

ESTIMATED EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT RED SQUIRRELS

Source: Suring et al. 1988

Gray Wolf

Forest-wide estimated changes in gray wolf habitat capability for each alternative are displayed in Figure 3-67. Table 3-187 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Gray Wolves in Southeast Alaska," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

Research in Southeast Alaska indicates wolf populations can exist in low numbers in the absence of large ungulate prey species, with densities of about .01 wolf per square mile (Suring et al. 1988). This density is used as a minimum habitat capability for wolves on the Forest, and is calculated to be about 160 animals. This accounts for about 17 to 18 percent of the habitat capability on the Forest.

The Analysis of the Management Situation (AMS, 1990) indicated that less than three percent of the wolf habitat capability on the Forest came from moose and mountain goats. Most of the habitat capability (80 percent) comes from Sitka black-tailed deer. Therefore, the changes in wolf habitat capability for each alternative closely parallel the changes in Sitka black-tailed deer habitat capability.

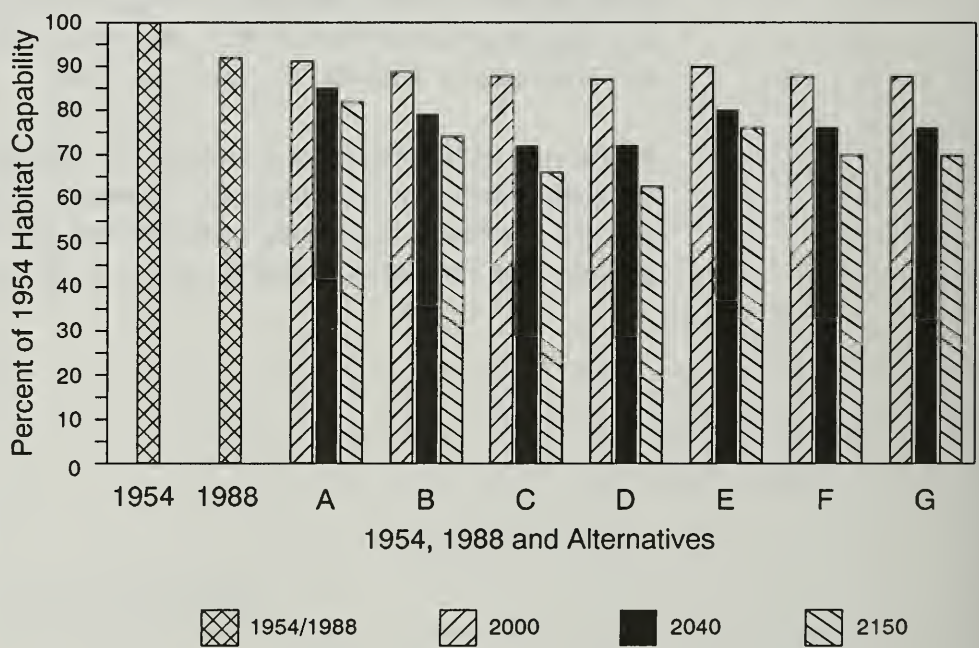
On a Forest-wide basis, the 1988 habitat capability for wolves was 92 percent of 1954 (an 8 percent reduction). In 1988 the Stikine Area was 92 percent of 1954 habitat capability, Ketchikan was 92 percent, and Chatham was 100 percent.

On a Forest-wide basis, by the year 2000, Alternative A habitat capability would be 91 percent of 1954; Alternative B would be 89 percent of 1954; Alternatives C, F, and G are 88 percent of 1954; Alternative D would be 87 percent of 1954, and Alternative E would be 90 percent of 1954.

By the year 2150, Alternative A provides for 82 percent of the 1954 habitat capability, Alternative B provides for 74 percent, Alternative C provides for 66 percent, Alternative D provides for 63 percent, Alternative E provides for 76 percent, and Alternatives F and G provide for 70 percent.

FIGURE 3-67

ESTIMATED CHANGES IN GRAY WOLF HABITAT CAPABILITY FOR EACH ALTERNATIVE, COMPARED TO 1954 HABITAT CAPABILITY



Source: Revision Database QODHEIG, March - 1990
QODHEI5, March - 1990
F.S. Forplan, March - 1990
F.S. Ams, January - 1990
Suring et al. 1988

TABLE 3-187
ESTIMATED CHANGES IN GRAY WOLF HABITAT CAPABILITY FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	54							
1988 % of 1954	100							
2000 % of 1954		100	100	100	100	100	100	100
2040 % of 1954		100	89	96	97	100	97	96
2150 % of 1954		99	89	95	97	100	96	95
Ketchikan								
1954 Animals[1]	586							
1988 % of 1954	92							
2000 % of 1954		90	89	88	88	89	88	88
2040 % of 1954		84	76	71	71	78	73	73
2150 % of 1954		81	70	62	62	73	66	65
Stikine								
1954 Animals[1]	321							
1988 % of 1954	92							
2000 % of 1954		89	88	85	84	88	86	86
2040 % of 1954		84	82	74	69	81	77	77
2150 % of 1954		82	79	69	60	78	74	74
Tongass Total								
1954 Animals[1]	961							
1988 % of 1954	92							
2000 % of 1954		91	89	88	87	90	88	88
2040 % of 1954		85	79	73	72	80	76	76
2150 % of 1954		82	74	66	63	76	70	70

Source: Revision Database, QODHEI6, QODHEI5, FS FORPLAN Analysis, March 1990; Suring, et al. 1988.
[1]1954 habitat capability is expressed in number of gray wolves

Bald Eagle

Forest-wide estimated changes in bald eagle nesting habitat capability for each alternative are displayed in Figure 3-68. Table 3-188 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Bald Eagles in Southeast Alaska: Nesting Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting within beach fringe and riparian areas and reductions in nesting habitat capability. Alternatives C and D with the highest allowable sale quantities which may affect beach fringe would have the greatest Forest-wide

reduction in habitat capability, while Alternatives A and B with no timber harvest scheduled in the beach fringe have the lowest Forest-wide reduction in habitat capability. The FORPLAN model did not schedule any timber harvest from riparian areas in all alternatives except B; in alternative B, a minor amount of timber harvest was scheduled from riparian areas (five million board feet per year). This amount of harvest from riparian areas would be equivalent to about 166 acres of clearcutting per year; this would then amount to a 2,000 year timber rotation within the riparian areas which does not produce a measurable effect on bald eagle nesting habitat. Although FORPLAN did not schedule timber harvesting within riparian areas, or only a minor amount in Alternative B, some harvesting may be considered during project-level analysis following standards and guidelines appropriate to riparian areas. Tables 3-22 and 3-23 in the Fish section provide additional information on potential harvesting in riparian areas. Site-specific analysis will be needed to measure effects on bald eagle nesting habitat capability in these instances.

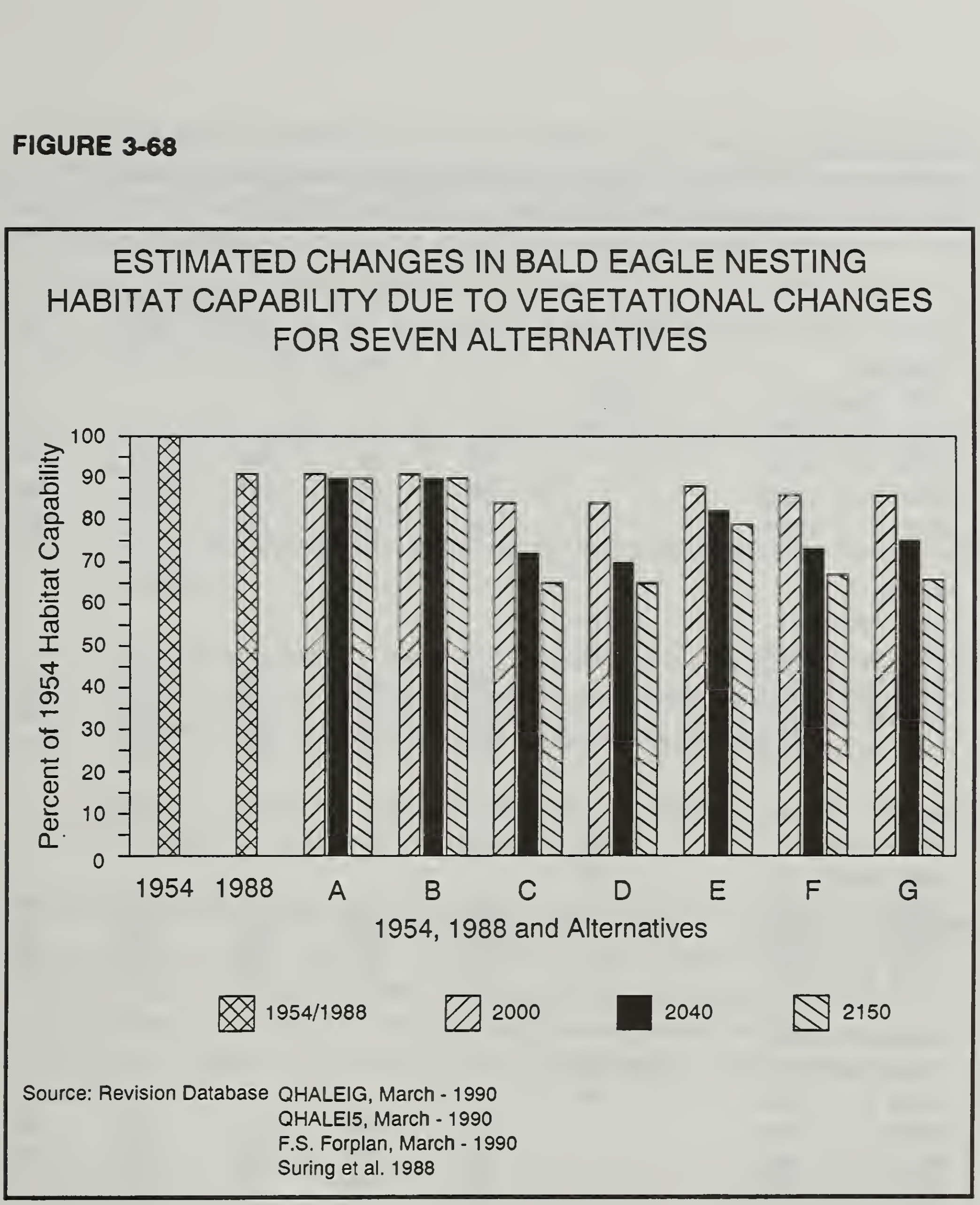
Bald eagle habitat capability for 1954, 1988 and alternatives in out decades are an underestimate of the total habitat capability on the Tongass because the Wilderness areas do not have riparian area data in the Forest-wide database; the result is that habitat capability will be underestimated for those areas. Also, for 1988 habitat capability, riparian buffers which have been maintained along rivers and streams in areas which have been roaded and logged ar not "picked-up" very well in the database. These riparian buffers help maintain habitat capability for bald eagles, and when they are not picked up in the GIS database, the result is an underestimate of habitat capability and an overestimate of effects due to logging activity for 1988.

On a Forest-wide basis, the 1988 habitat capability for bald eagles was 91 percent of 1954. In 1988 the Stikine Area was 91 percent of 1954 habitat capability, Ketchikan was 90 percent, and Chatham was 91 percent.

On a Forest-wide basis, by the year 2000, Alternative A and B habitat capability would be 91 percent of 1954; Alternative C and D habitat capability would be 84 percent of 1954; Alternative E would be 88 percent of 1954; Alternatives F and G would be 86 percent of 1954.

By the year 2150, Alternatives A and B provide for 90 percent of the 1954 habitat capability, Alternatives C and D provide for 65 percent, Alternative E provides for 79 percent, Alternatives F and G provide for 67 and 66 percent, respectively.

FIGURE 3-68



Nesting habitat has not been determined to be limiting bald eagle populations in Southeast Alaska. The U. S. Fish and Wildlife Service has conducted adult bald eagle population surveys for the years 1967, 1977, 1982, and 1987. Adult population estimates for these surveys are: 1967 - 7,230; 1977 - 7,329; 1982 - 10,933; 1987 - 12,074 (Jacobson 1989). Figure 3-68 and Table 3-188 indicates that there is unused nesting habitat capability when compared to the existing adult bald eagle population estimate. Additional nesting habitat capability also exists on non-National Forest lands in Southeast Alaska, and this further indicates that not all of the available nesting habitat capability is currently used by the bald eagle population.

TABLE 3-188
ESTIMATED CHANGES IN BALD EAGLE NESTING HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.
Note: These estimated changes in habitat capability may overstate the actual effects. See text for discussion.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	8,100							
1988 % of 1954	91							
2000 % of 1954		91	91	89	89	91	89	91
2040 % of 1954		90	90	80	80	90	78	82
2150 % of 1954		90	90	75	80	90	73	74
Ketchikan								
1954 Animals[1]	6,629							
1988 % of 1954	90							
2000 % of 1954		90	90	86	87	86	87	87
2040 % of 1954		89	89	68	64	75	71	70
2150 % of 1954		89	89	55	56	67	60	59
Stikine								
1954 Animals[1]	5,451							
1988 % of 1954	91							
2000 % of 1954		91	91	73	74	84	78	78
2040 % of 1954		90	90	63	58	75	68	68
2150 % of 1954		90	90	58	50	73	64	64
Tongass Total								
1954 Animals[1]	20,180							
1988 % of 1954	91							
2000 % of 1954		91	91	84	84	88	86	86
2040 % of 1954		90	90	72	70	82	73	75
2150 % of 1954		90	90	65	65	79	67	66

Source: QHALEIG, QHALEI5, FS FORPLAN Analysis, March 1990; Suring et al. 1988.
[1]1954 habitat capability is expressed in number of adult bald eagles.

There are other factors which indicate that more than just the availability of suitable nest trees affects the abundance and distribution of bald eagles. For one, nest survey data from the U.S. Fish and Wildlife Service illustrate that nest densities along the coast range from a high of 10.4 nests per mile of shoreline to zero nests per mile of shoreline, and this range is not solely the result of the presence or absence of suitable nest trees.

An Interagency Agreement is maintained between the U.S. Fish and Wildlife Service and the USDA Forest Service for bald eagle management in Southeast Alaska. This interagency agreement provides the following standards and guidelines for management of bald eagle nest sites:

1. Establish and maintain a minimum 330 foot (100 meter) radius (horizontal distance) eagle nest buffer zone around each eagle nest tree. Determine the exact boundary based on local topography, timber type, windfirmness, and other factors.

2. Within the eagle nest zones, prohibit all land use activity which would likely disturb the eagles.

3. Maintain the eagle nest zone even though the nest or nest tree becomes inactive.

4. Retain trees suitable for use by eagles for nesting, feeding, roosting and perching.

5. Include special clauses and specifications in contracts, special use permits, fire wood permits, and sawtimber free use provisions that incorporate bald eagle habitat protection and management measures.

6. Maintain the Interagency Agreement for bald eagle management and the Seymour bald eagle management area.

The habitat capability estimates in Figure 3-68 and Table 3-188 may overestimate the effects on habitat capability. The reason for this is that all beach fringe, estuary fringe, and riparian areas are surveyed for bald eagle nests prior to any vegetation disturbing or land disturbing management activities. Any area with a known eagle nest is to be protected as outlined in the Interagency Agreement.

There is concern that the 330 foot (100 meter) radius nest buffer may not be adequate to provide long-term protection of specific nest sites. These 330 foot nest buffers may not be wind firm if timber harvest or related activities occur adjacent to these protective zones. An additional adverse impact on bald eagle nesting habitat capability can be expected as a result of blowdown of nest tree buffer zones. Hodges (1982) found that an average of 17 percent of the 330 foot protective buffer could be lost to blowdown in 42 percent of the buffer zones adjacent to clearcuts on just one side of the zone. The proportion of the buffer zone lost to blowdown would be greater if the clearcut surrounded the buffer zone. This loss occurred within the first five years after harvest. This equates to an additional seven percent reduction in long-term bald eagle nesting habitat capability within identified bald eagle nest buffers.

With the current analysis and understanding of the adult bald eagle population and the total nesting habitat capability on the Forest, it appears that the existing bald eagle population can be maintained with adequate nesting habitat with all alternatives.

Hairy Woodpecker

Forest-wide estimated changes in hairy woodpecker winter habitat capability for each alternative are displayed in Figure 3-69. Table 3-189 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Hairy Woodpeckers in Southeast Alaska: Winter Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Alternative D with the highest allowable sale quantity level has the greatest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity would have the lowest Forest-wide reduction in winter habitat capability.

On a Forest-wide basis, the 1988 winter habitat capability for hairy woodpeckers was 86 percent of 1954. In 1988 the Stikine Area was 85 percent of 1954 habitat capability, Ketchikan was 83 percent, and Chatham was 92 percent.

On a Forest-wide basis, by the year 2000, Alternative A habitat capability would be 84 percent of 1954; Alternatives B, F, and G would be 83 percent of 1954; Alternative C would be 82 percent of 1954; Alternative D would be 81 percent of 1954, and Alternative E would be 84 percent of 1954.

By the year 2150, Alternative A provides for 76 percent of the 1954 habitat capability, Alternative B provides for 67 percent, Alternative C provides for 60 percent, Alternative D provides for 58 percent, Alternative E provides for 70 percent, and Alternatives F and G provide for 62 percent.

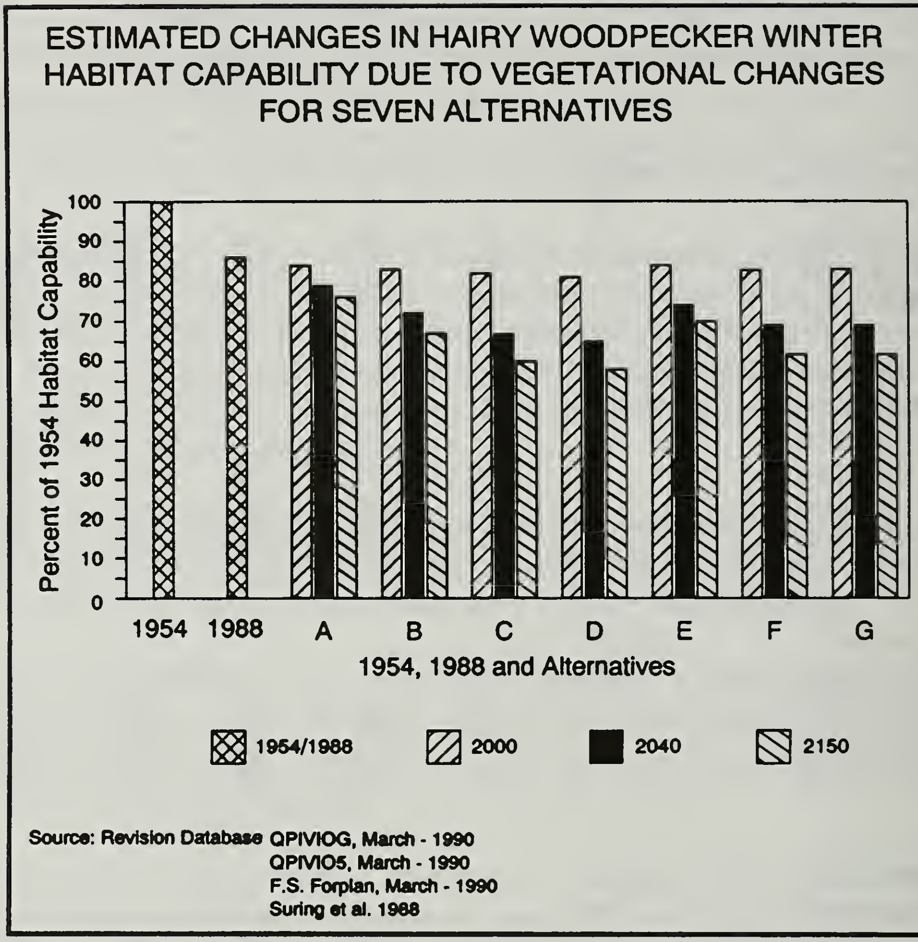
TABLE 3-189
ESTIMATED CHANGES IN HAIRY WOODPECKER WINTER HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	41,860							
1988 % of 1954	92							
2000 % of 1954		91	90	90	90	91	90	90
2040 % of 1954		91	83	81	82	90	81	81
2150 % of 1954		90	79	76	78	89	75	75
Ketchikan								
1954 Animals[1]	49,844							
1988 % of 1954	83							
2000 % of 1954		80	77	77	76	79	78	78
2040 % of 1954		71	62	58	55	64	60	59
2150 % of 1954		67	57	50	48	58	52	52
Stikine								
1954 Animals[1]	27,880							
1988 % of 1954	85							
2000 % of 1954		82	81	79	77	81	80	80
2040 % of 1954		74	71	63	57	69	67	67
2150 % of 1954		71	67	55	45	66	61	61
Tongass Total								
1954 Animals [1]	119,584							
1988 % of 1954	86							
2000 % of 1954		84	83	82	81	84	83	83
2040 % of 1954		79	72	67	65	74	69	69
2150 % of 1954		76	67	60	58	70	62	62

Source: Revision Database, QPIVIOF, QPIVIO5, FS FORPLAN Analysis, March 1990. Suring, et al., 1988.
[1] 1954 habitat capability is expressed in number of animals for winter habitat.

The estimated effects in Figure 3-69 and Table 3-189 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-70). With the Revision database, it was not possible to identify existing patch sizes for analysis nor is it appropriate to estimate future patch sizes which may result from site-specific project implementation.

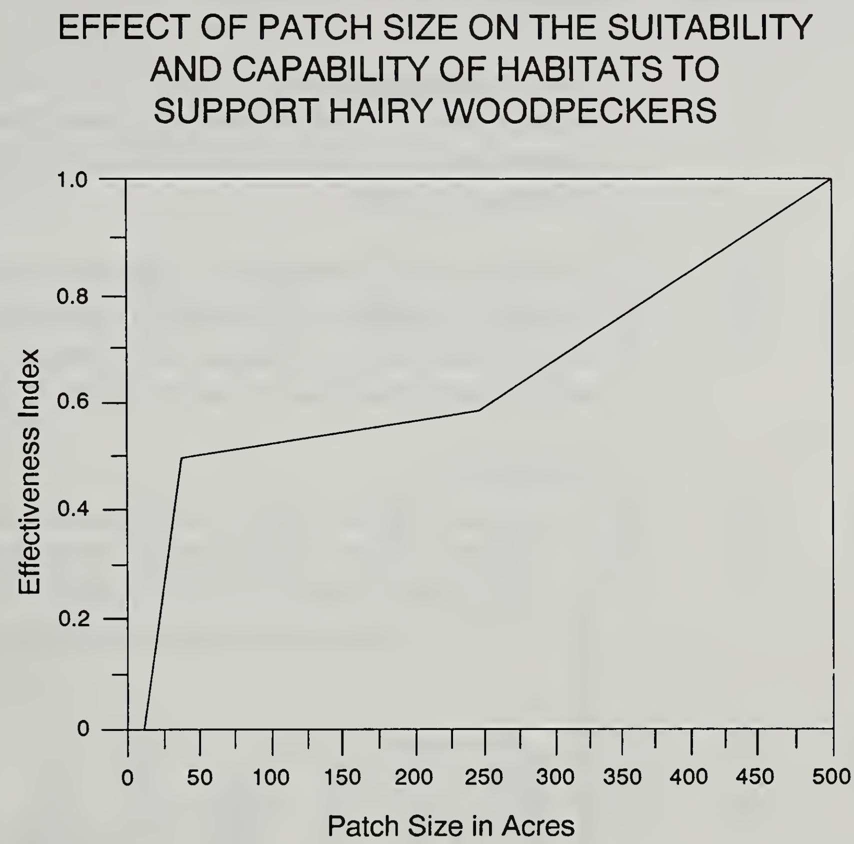
FIGURE 3-69



The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to management prescriptions allowing consideration of timber harvest. Natural old-growth patch sizes would be maintained with those areas of land allocated to management prescriptions with no scheduled timber harvest. Table 3-172 (in previous Sitka black-tailed deer section) displays the amount of productive old growth in both groups of prescriptions for each alternative.

Not all of the productive old growth is scheduled to be harvested even in the management prescriptions which allow timber harvesting (see Table 3-172 in previous Sitka black-tailed deer section). There are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project analysis which is not appropriate at the programmatic Forest Plan level. Forest-wide Standards & Guidelines direct project-level analysis to utilize the old-growth patch size relationship as currently described by Suring, et al.

FIGURE 3-70



Source: Suring et al. 1988

Red-Breasted Sapsucker

Forest-wide estimated changes in red-breasted sapsucker breeding habitat capability for each alternative are displayed in Figure 3-71. Table 3-190 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Red-breasted Sapsuckers in Southeast Alaska: Breeding Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting in old-growth forests and reductions in breeding habitat capability. Alternative D with the highest allowable sale quantity has the greatest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest timber harvest level has the lowest potential for in winter habitat capability.

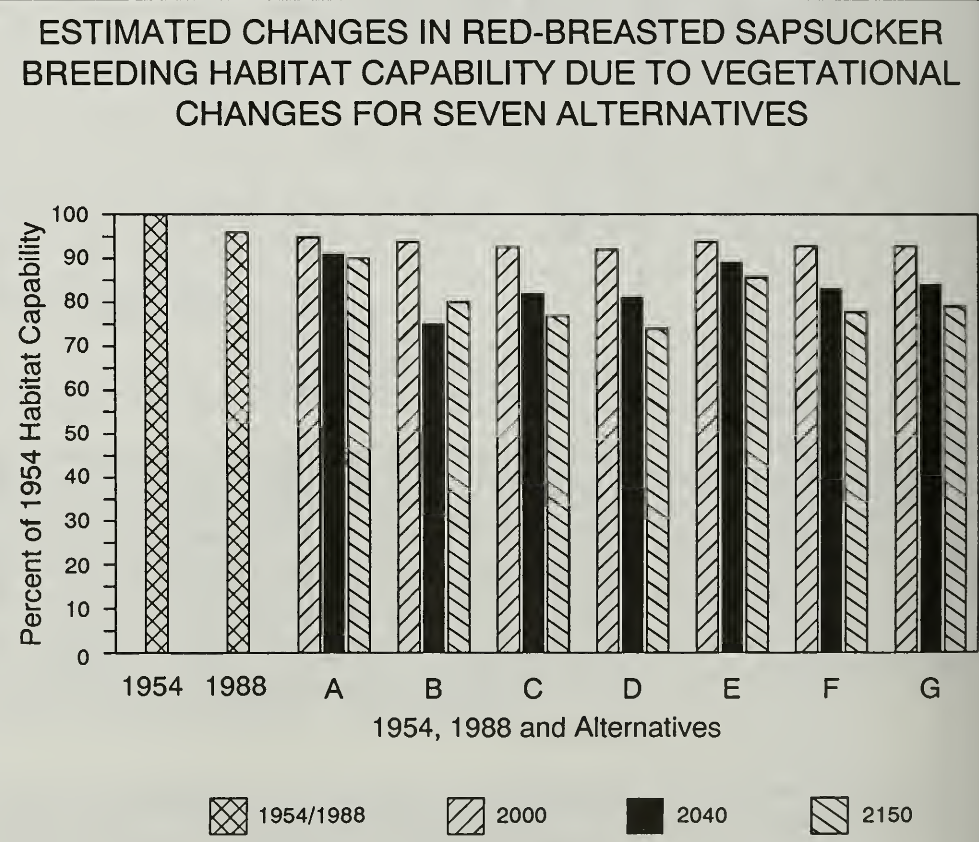
On a Forest-wide basis, the 1988 breeding habitat capability for red-breasted sapsuckers was 96 percent of 1954. In 1988 the Stikine Area was 95 percent

of 1954 habitat capability, Ketchikan was 94 percent, and Chatham was 97 percent.

On a Forest-wide basis, by the year 2000, Alternative A habitat capability would be 95 percent of 1954; Alternatives B and E would be 94 percent of 1954; Alternatives C, F, and G would be 93 percent of 1954; Alternative D would be 92 percent of 1954.

By the year 2150, Alternative A provides for 90 percent of the 1954 habitat capability, Alternative B provides for 80 percent, Alternative C provides for 77 percent, Alternative D provides for 74 percent, Alternative E provides for 86 percent, and Alternatives F and G provide for 78 and 79 percent, respectively.

FIGURE 3-71



Source: Revision Database QSPVAOG, March - 1990
QSPVAO5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

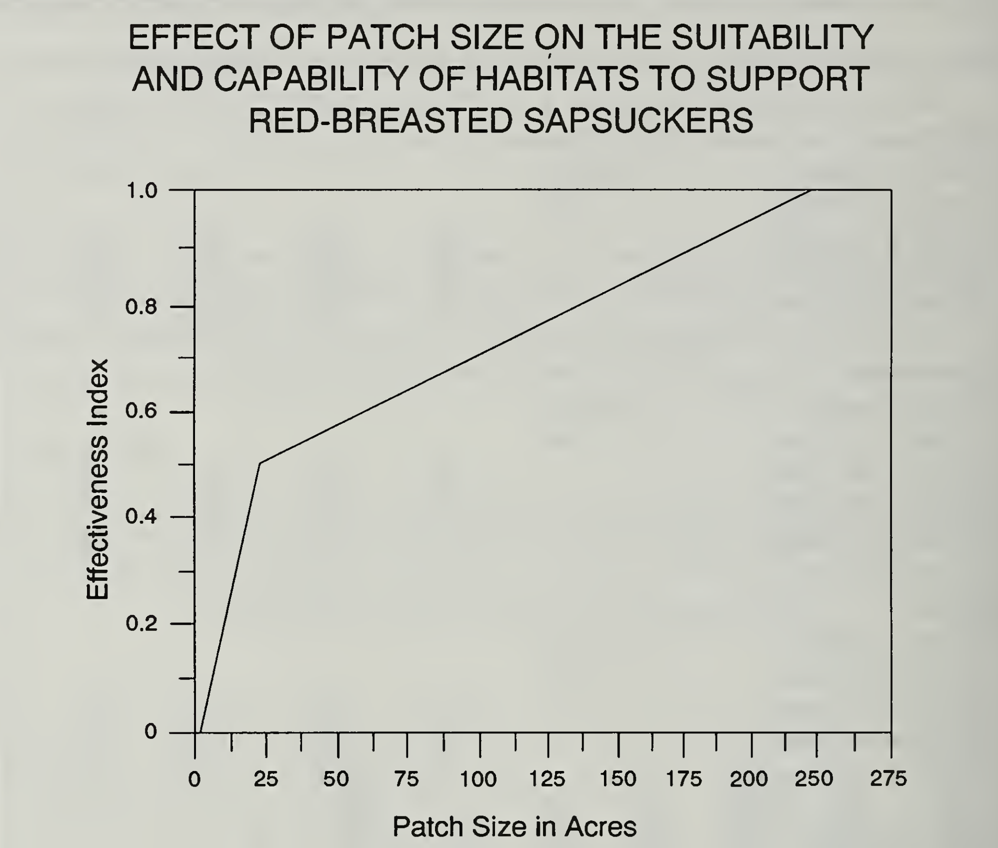
TABLE 3-190
ESTIMATED CHANGES IN RED-BREASTED SAPSUCKER BREEDING HABITAT CAPABILITY FOR EACH ALTERNATIVE DUE TO CHANGES IN VEGETATIVE CONDITIONS, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	374,337							
1988 % of 1954	97							
2000 % of 1954		97	96	96	96	97	96	96
2040 % of 1954		97	90	89	90	97	89	89
2150 % of 1954		97	85	86	87	96	85	85
Ketchikan								
1954 Animals[1]	378,573							
1988 % of 1954	94							
2000 % of 1954		93	92	92	91	92	91	91
2040 % of 1954		88	79	77	77	83	79	79
2150 % of 1954		86	72	71	69	79	72	73
Stikine								
1954 Animals[1]	241,707							
1988 % of 1954	95							
2000 % of 1954		93	93	90	88	92	91	91
2040 % of 1954		88	87	79	73	84	82	82
2150 % of 1954		86	84	73	60	81	78	78
Tongass Total								
1954 Animals[1]	994,617							
1988 % of 1954	96							
2000 % of 1954		95	94	93	92	94	93	93
2040 % of 1954		91	85	82	81	89	83	84
2150 % of 1954		90	80	77	74	86	78	79

Source: Revision Database QDVAOG, QSPA05, FS FORPLAN Analysis, March 1990; Suring et al. 1988
[1] 1954 habitat capability is expressed in number of animals for spring habitat.

The estimated effects in Figure 3-71 and Table 3-190 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-72). With the Revision database, it was not possible to identify existing patch sizes for analysis, nor is it feasible to estimate future patch sizes which may result from site-specific project implementation.

FIGURE 3-72



Source: Suring et al. 1988

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to management prescriptions which allow considering. Natural old-growth patch sizes would be maintained with those areas of land allocated to management prescriptions with no scheduled timber harvest. Table 3-172 (in previous Sitka black-tailed deer section) displays the amount of productive old growth in both groups of prescriptions for each alternative.

Not all of the productive old growth is scheduled to be harvested even in the management prescriptions which allow consideration of timber harvest (see Table 3-172 in previous Sitka black-tailed deer section). There are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project analysis which is not appropriate at the programmatic Forest Plan level. Forest-wide Standards & Guidelines direct project-level analysis to utilize the old-growth patch size relationship as currently described by Suring, et al.

Brown Creeper

Forest-wide estimated changes in brown creeper winter habitat capability for each alternative are displayed in Figure 3-73. Table 3-191 displays estimated changes by the three Administrative Areas of the Forest. In making these estimates, the "Habitat Capability Model for Brown Creepers in Southeast Alaska: Winter Habitat," (Suring et al. 1988) was used. The Analysis of the Management Situation, Tongass National Forest, (January 1990, p. 3-661-663) describes how the habitat capability model was applied to the Revision Database.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Brown creepers are more dependent on high volume old-growth habitats (over 30 MBF per acre) than any of the other MIS (Suring, et al. 1988). Alternative D with the highest allowable sale quantity has the greatest potential Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential Forest-wide reduction in winter habitat capability.

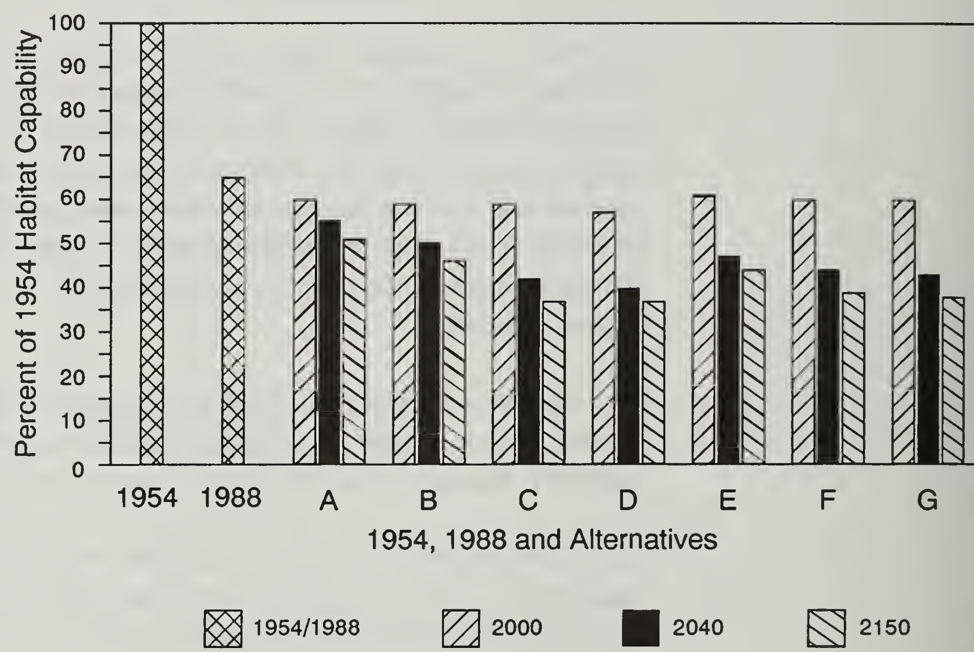
On a Forest-wide basis, the 1988 winter habitat capability for brown creepers was 65 percent of 1954. In 1988 the Stikine Area was 55 percent of 1954 habitat capability, Ketchikan was 63 percent, and Chatham was 74 percent.

On a Forest-wide basis, by the year 2000, Alternatives A, F, and G habitat capabilities would be 60 percent of 1954; Alternatives B, and C would be 59 percent percent of 1954; Alternative D would be 57 percent of 1954; Alternative E would be 61 percent of 1954.

By the year 2150, Alternative A provides for 51 percent of the 1954 habitat capability, Alternative B provides for 46 percent, Alternatives C and D provide for 37 percent, Alternative E provides for 44 percent, and Alternatives F and G provide for 39 and 38 percent, respectively.

FIGURE 3-73

ESTIMATED CHANGES IN BROWN CREEPER WINTER HABITAT CAPABILITY DUE TO VEGETATIONAL CHANGES FOR SEVEN ALTERNATIVES



Source: Revision Database QCEFAOG, March - 1990
QCEFAO5, March - 1990
F.S. Forplan, March - 1990
Suring et al. 1988

The estimated effects in Figure 3-73 and Table 3-191 do not include an evaluation of the effects of old-growth patch size as described by Suring et al. (1988) (Figure 3-74). With the Revision database, it was not possible to identify patch sizes for analysis. It is not expected that a large amount of patch sizes will be less than the 15-20 acre optimum size in any alternative; therefore, additional reductions in habitat capability due to small patch sizes are expected to be very small.

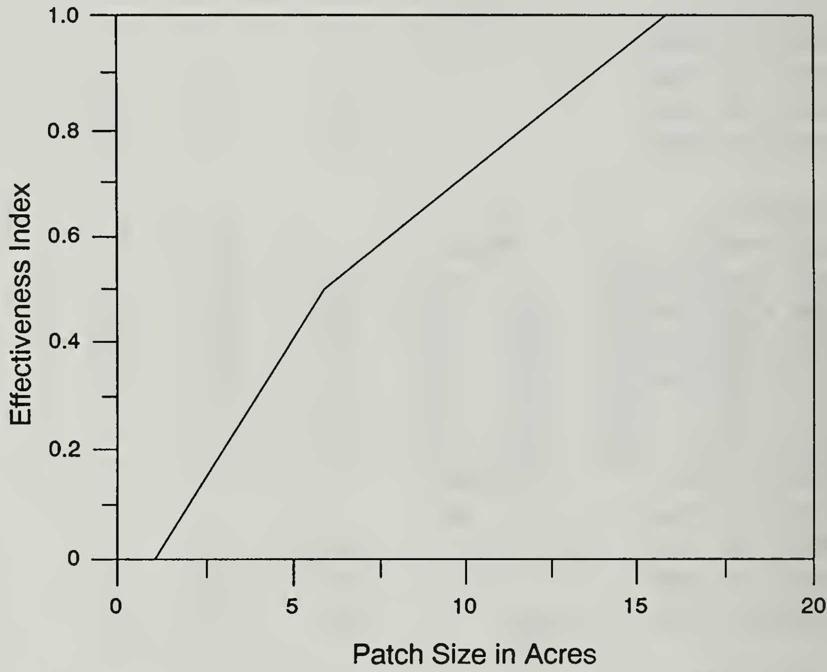
TABLE 3-191
ESTIMATED CHANGES IN BROWN CREEPER WINTER HABITAT CAPABILITY DUE TO CHANGES IN VEGETATIVE CONDITIONS FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954 Animals[1]	44,275							
1988 % of 1954	74							
2000 % of 1954		74	72	73	73	73	73	73
2040 % of 1954		73	68	63	64	70	63	63
2150 % of 1954		72	65	59	61	70	59	59
Ketchikan								
1954 Animals[1]	69,239							
1988 % of 1954	63							
2000 % of 1954		56	54	53	49	57	55	55
2040 % of 1954		48	42	32	29	36	34	33
2150 % of 1954		42	39	25	25	31	29	27
Stikine								
1954 Animals[1]	28,909							
1988 % of 1954	55							
2000 % of 1954		50	49	51	48	53	51	51
2040 % of 1954		44	39	32	28	36	35	35
2150 % of 1954		38	36	29	28	34	32	32
Tongass Total								
1954 Animals[1]	142,423							
1988 % of 1954	65							
2000 % of 1954		60	59	59	57	61	60	60
2040 % of 1954		55	50	42	40	47	44	43
2150 % of 1954		51	46	37	37	44	39	38

Source: Revision Database QCEFAOG, QCEFA05, FS FORPLAN Analysis, March 1990, Suring, et al, 1988.
[1] 1954 habitat capability is expressed in number of animals for winter habitat.

FIGURE 3-74

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT BROWN CREEPERS



Source: Suring et al. 1988

Vancouver Canada Goose

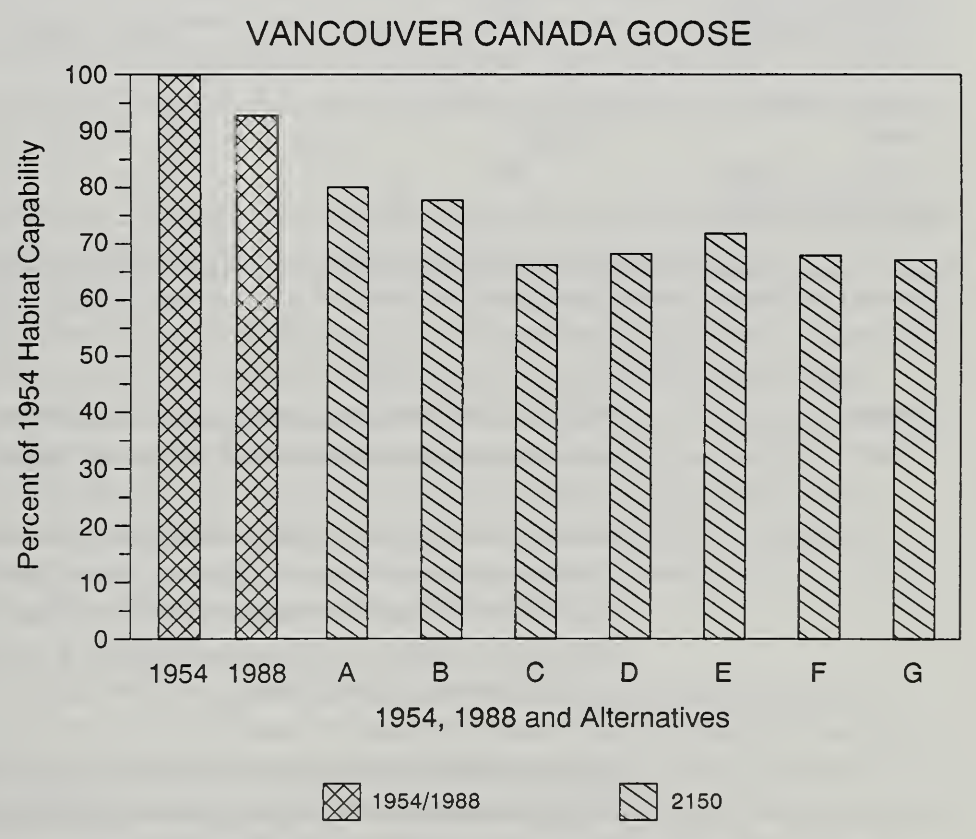
Potential changes in nesting and brood rearing habitat capability for Vancouver Canada geese is displayed in Figure 3-75. Table 3-192 displays potential changes in nesting and brood rearing habitat capability for geese for each of the three Administrative Areas of the Forest. Plant associations are used to identify which old-growth forest types have value for nesting and brood rearing (Doyle et al. 1988). The data in Figure 3-75 and Table 3-192 assumes that all of the old-growth forest types which have value for goose nesting and brood rearing that are suitable for timber harvesting (which have been allocated to a management prescription which allows timber harvesting and are suitable for timber harvesting) will be logged. This is considered a potential maximum effects analysis.

On a Forest-wide basis, 92 percent of the 1954 habitat capability for goose nesting and brood rearing was remaining in 1988. By the year 2150, Alternative A would maintain 80 percent of the habitat capability, Alternative

B would maintain 77 percent, Alternatives C would maintain 66 percent, Alternatives D and F would maintain 68 percent, Alternative E would maintain 71 percent, and Alternative G would maintain 67 percent.

The estimated effects in Figure 3-75 and Table 3-192 do not include the effects of roads and associated human disturbance as described by Doyle et al. (1988). The Revision database does not contain the information necessary to conduct this kind of analysis. Forest-wide direction and standards and guidelines have been developed to reduce human disturbance of geese and other waterfowl (see Appendix G, Wildlife Forest-wide Direction and Standards and Guidelines).

FIGURE 3-75



Source: Revision Database QBRCAOG, April - 1990
QBRCASG, April - 1990
QBRCASG1, April - 1990
Doyle et al. 1988

TABLE 3-192
ESTIMATED CHANGES IN VANCOUVER CANADA GOOSE NESTING AND BROOD REARING HABITAT DUE TO CHANGES IN VEGETATIVE CONDITION FOR EACH ALTERNATIVE, COMPARED TO 1954.

		Alternatives						
		A	*B*	*C*	*D*	*E*	*F*	*G*
Chatham								
1954	4,969 [1]							
1988 % OF 1954	96							
2150 % OF 1954		88	86	74	79	80	77	76
Ketchikan								
1954	6,589 [1]							
1988 % OF 1954	91							
2150 % OF 1954		78	77	63	66	79	66	65
Stikine								
1954	5,829 [1]							
1988 % OF 1954	90							
2150 % OF 1954		76	71	63	61	69	63	63
Tongass Total								
1954	17,387 [1]							
1988 % OF 1954	92							
2150 % OF 1954		80	77	66	68	71	68	67

Source: Revision Database QBRCAOG, QBRCASG, QBRCASG1, April 1990; Doyle, et al. 1988.
[1] Estimated 1954 habitat capability expressed in the number of adult breeders and adult non-breeders.

Moose

Moose habitat in Southeast Alaska is associated primarily with riparian and post-glacial early-successional vegetation types (ADF&G 1989).

In most areas, much of the moose habitat is declining as a result of natural plant succession. Succession in some areas is transforming deciduous vegetation types (dominated by cottonwood trees, willows, etc.) into conifer stands. In other areas, climax deciduous vegetation is growing to sizes less valuable as moose browse (ADF&G 1989).

In some moose habitat areas, clearcut logging has returned conifer stands to early successional vegetation types which may temporarily create or enhance forage for moose. This forage enhancement exists for about 25 years out of a 100 year timber harvest rotation. As second growth timber stands become established in the logged areas, forage production is severely diminished to levels below that of the original old-growth forest. The short term advantages of clearcutting for moose may be offset by the longer period of reduced forage in the second growth conifer forest (ADF&G 1989).

Table 3-193 displays moose populations, road and access information, old growth forest information, and land allocation patterns for each alternative for geozones which currently have moose populations. Currently there are 18 geozones with moose; seven of these geozones are in designated Wilderness areas. Portions of nine geozones are currently roaded, with 528 miles of permanent road. About 35 percent (184 miles) of the road miles are closed. Three of the geozones have ferry or town access to the roads. All of the geozones except for two had 90 percent or more of the 1954 productive old growth acres remaining in 1988. The two geozones below 90 percent have 83 and 84 percent of the 1954 productive old growth remaining.

Additional Wilderness areas are recommended in Alternatives A and E for portions of eight geozones. Both Wilderness and Natural Setting land allocations have no scheduled timber harvesting. Alternative A has the highest percentage of land in Wilderness and Natural Setting allocations, followed by Alternatives B, E, D, F, G and C. Conversely, Alternative C has the highest percentage of land in moderate and intensive development allocations, followed by Alternatives G, F, D, E, B, and A. Alternative D has the highest percentage of land in intensive development allocations, and has the highest allowable sale quantity, followed by Alternatives C, B, G, F, E and A.

Alternative D would likely have highest total road miles, followed by Alternatives C, G, F, B, E, and A.

Moose habitat allocated to Wilderness and Natural Setting allocations is expected to gradually decline in habitat capability due to natural plant succession. Early-successional vegetation types (cottonwoods, willows, etc.) will gradually be replaced by conifer types which will provide less forage availability. Field work examined various techniques to help maintain the early-successional communities, such as burning or cutting. To date, cost effective techniques capable of treating enough acres to have a measurable positive effect on moose habitat and populations have not been identified.

Moose habitat allocated to moderate and intensive development allocations may have short term increases in habitat capability due to increased forage in logged areas during the first 25 years following logging. The short-term advantages of clearcutting may be offset by the longer period of reduced forage in the second-growth conifer forests. There is also concern that the second growth conifer forests will not provide the quality of cover that old growth forests can provide.

Some work has been done to examine alternative logging techniques which would have longer lasting benefits for moose habitat capability. Some ideas currently being expressed include: 1) Logging portions of moose habitat and keeping the logged areas in permanent early succession plant communities by

periodic cutting or burning or some other treatment of the vegetation. This would result in a one-time harvesting of wood products from the logged areas. 2) Logging portions of moose habitat and then using the shortest possible timber rotations to reduce the amount of time logged areas are in second growth conifer conditions. The intended result of this would be to have more acres in early-successional stages at any given time because of the shorter timber rotations. These ideas have not been fully modeled or tested to assess their feasibility or their effects on both timber resources and moose habitat capability.

TABLE 3-193

SUMMARY OF ESTIMATED MOOSE POPULATIONS, ACCESS, AND LAND ALLOCATIONS AND ROAD INFORMATION BY ALTERNATIVE FOR GEOZONES WITH MOOSE

	Geozone																	
	C14	C16	C17	C18	C22	C23	C24	C25	S01	S03	S04	S08	S09	S10	S11	S12	S13	K13
Estimated Population[1]	—	50	—	100	435	240	400	—	—	—	—	200	—	—	—	450	—	35
Access to Ferry or Town	No	No	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No
Ecisting Road Miles	0	0	0	32.5	16.9	0	51.6	0.9	156.5	125.3	123.3	21.4	0	0	0	0	0	0
Percent of Road Miles Closed	—	—	—	21	0	—	15	0	50	47	15	64	—	—	—	—	—	—
Old Growth Acres 1954[2]	34.0	15.3	24.2	61.6	19.3	166.2	39.2	154.8	206.7	131.9	69.5	109.0	197.2	126.4	47.2	70.2	22.7	607.0[3]
% Old Growth in 1988[4]	100	100	100	97	95	99	83	100	91	90	84	94	97	96	99	100	100	100
ALTERNATIVE A																		
% Intensive Development	0	0	0	1	0	0	0	5	18	35	7	3	4	35	0	0	0	0
% Moderate Development	0	0	0	69	0	6	9	14	34	35	65	9	12	12	0	0	0	0
% Natural Setting	0	0	0	31	70	91	89	9	16	15	29	88	79	7	0	0	0	0
% Wilderness	100	100	100	0	30	3	2	72	32	15	0	0	5	46	100	100	100	100
Miles of Road Yr. 2000	0	0	0	35	17	0	58	8	236	131	177	50	21	0	0	0	0	13
Yr. 2150	0	0	0	41	17	0	76	13	473	149	235	105	64	0	0	0	0	13
ALTERNATIVE B																		
% Intensive Development	0	0	0	1	0	1	0	18	54	53	29	10	12	63	0	0	0	0
% Moderate Development	0	0	0	69	0	7	23	14	7	29	52	6	5	13	0	0	0	0
% Natural Setting	0	0	0	31	100	92	77	68	39	18	19	84	83	24	0	0	0	0
% Wilderness	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Miles of Road Yr. 2000	0	0	0	78	17	39	75	64	297	130	154	49	17	0	0	0	0	13
Yr. 2150	0	0	0	213	17	156	144	253	545	145	247	133	68	0	0	0	0	13
ALTERNATIVE C																		
% Intensive Development	0	0	0	0	0	1	23	63	69	66	31	19	38	74	0	0	0	0
% Moderate Development	0	0	0	75	17	17	10	30	4	27	64	5	10	15	0	0	0	0
% Natural Setting	0	0	0	25	83	82	67	8	27	8	5	76	52	10	0	0	0	0
% Wilderness	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Miles of Road Yr. 2000	0	0	0	40	29	0	70	107	310	163	183	81	69	7	0	0	0	13
Yr. 2150	0	0	0	61	65	0	124	425	693	277	283	261	276	28	0	0	0	13
ALTERNATIVE D																		
% Intensive Development	0	0	0	4	9	15	23	56	85	78	71	23	29	90	0	0	0	0
% Moderate Development	0	0	0	64	0	0	6	3	5	10	20	1	1	3	0	0	0	0
% Natural Setting	0	0	0	32	91	84	71	40	11	12	9	76	70	8	0	0	0	0
% Wilderness	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Miles of Road Yr. 2000	0	0	0	64	38	4	78	64	363	247	223	149	117	48	0	0	0	13
Yr. 2150	0	0	0	157	101	16	156	253	909	613	375	317	320	192	0	0	0	13

TABLE 3-193 (continued)
SUMMARY OF ESTIMATED MOOSE POPULATIONS, ACCESS, AND LAND ALLOCATIONS AND ROAD INFORMATION BY ALTERNATIVE FOR GEOZONES WITH MOOSE

	Geozone																	
	C14	C16	C17	C18	C22	C23	C24	C25	S01	S03	S04	S08	S09	S10	S11	S12	S13	K13
ALTERNATIVE E																		
% Intensive Development	0	0	0	0	0	1	23	24	58	66	31	19	38	52	0	0	0	0
% Moderate Development	0	0	0	75	0	17	10	4	4	18	64	5	10	1	0	0	0	0
% Natural Setting	0	0	0	25	70	80	64	0	6	1	5	76	47	0	0	0	0	0
% Wilderness	100	100	100	0	30	3	2	72	32	15	0	0	5	46	100	100	100	100
Miles of Road Yr. 2000	0	0	0	33	17	0	68	8	242	130	158	78	81	0	0	0	0	13
Yr. 2150	0	0	0	33	17	0	116	13	497	145	247	249	244	0	0	0	0	13
ALTERNATIVE F																		
% Intensive Development	0	0	0	0	0	1	23	46	68	66	31	19	38	74	0	0	0	0
% Moderate Development	0	0	0	75	0	17	10	22	4	27	64	5	10	15	0	0	0	0
% Natural Setting	0	0	0	25	100	82	67	32	28	8	5	76	52	10	0	0	0	0
% Wilderness	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Miles of Road Yr. 2000	0	0	0	52	19	0	70	86	291	130	141	78	61	0	0	0	0	13
Yr. 2150	0	0	0	109	25	0	124	341	617	145	195	249	244	0	0	0	0	13
ALTERNATIVE G																		
% Intensive Development	0	0	0	0	0	1	23	61	68	66	31	19	38	74	0	0	0	0
% Moderate Development	0	0	0	75	0	17	10	25	4	27	64	5	10	15	0	0	0	0
% Natural Setting	0	0	0	25	100	82	67	15	28	8	5	76	52	10	0	0	0	0
% Wilderness	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Miles of Road Yr. 2000	0	0	0	52	17	0	70	103	292	130	141	78	61	0	0	0	0	13
Yr. 2150	0	0	0	109	17	0	124	409	621	145	195	249	244	0	0	0	0	13

Source: Revision Database Q260, March 1990.

[1]This is the estimated post hunt moose population from Alaska Department of Fish and Game "Strategic Plan for Managment of Moose in Region I, Southeast Alaska, 1990-94," Public Review Draft, July 1989. Population estimates are not available for some geozones.

[2]Productive conifer old growth acres in 1954, in thousands of acres. See Old Growth Forests section for definitions of old growth.

[3]The productive old growth acres shown for geozone K13 are for the entire geozone; moose are only present in a small portion of this geozone.

[4]Estimated percent of 1954 productive old growth remaining in 1988.

EFFECTS ON MEETING HUNTER DEMANDS

Table 3-194 displays a summary of historic (1980-1988) and projected (1995-2035) hunter use and demand for deer, moose, mountain goat, black bear, and waterfowl for the Tongass National Forest. Hunter demand is expressed in the number of hunter-days as defined by the Alaska Department of Fish and Game. One hunter-day is equivalent to one person hunting for any length of time during a 24-hour period. Moose and mountain goat use projections for 1995-2035 are held constant because demand currently exceeds capacity for these species. Demand for moose and mountain goat is expected to continue to increase and outpace any increased capacity. Waterfowl demand projections for 1995-2035 are held constant, because it is not anticipated that the declines in waterfowl hunter days which occurred during the 1980's will continue. It is not possible to predict if future waterfowl demand will increase.

TABLE 3-194
HISTORIC (1980-1988) AND PROJECTED (1995-2035) HUNTER DEMAND FOR WILDLIFE RESOURCES
Thousands of Hunter Days (MHD's).

Year	*Deer MHD's*	*Moose MHD's*	*Mtn. Goat MHD's*	*Black Bear MHD's* [1]	*Brown Bear MHD's* [1]	*Waterfowl MHD's*
1980	31.4	-	1.4	.8	.5	-
1981	-	-	1.8	.8	.4	-
1982	45.7	-	1.8	1.0	.4	-
1983	52.6	-	1.7	.9	.6	14.4
1984	54.5	5.8	1.5	1.1	.6	13.5
1985	50.3	4.4	1.5	1.4	.5	10.1
1986	67.2	4.0	1.4	1.6	.6	10.1
1987	67.0	4.2	1.3	1.7	.7	-
1988	49.4	4.2	-	-	-	-
1995	83.3	4.6	1.7	2.6	.9	10.1
	(47.9-118.7)[2]			(2.0-3.2)	(.5-1.2)	
2005	104.1	4.6	1.7	3.5	1.1	10.1
	(52.6-155.6)			(2.6-4.4)	(.5-1.6)	
2015	120.0	4.6	1.7	4.1	1.2	10.1
	(55.2-184.8)			(3.0-5.3)	(.6-1.9)	
2025	128.5	4.6	1.7	4.5	1.3	10.1
	(56.5-200.5)			(3.2-5.7)	(.6-2.0)	
2035	136.9	4.6	1.7	4.8	1.4	10.1
	(57.6-216.2)			(3.5-6.2)	(.6-2.2)	

Source: 1980 through 1988 hunter days are from Alaska Department of Fish and Game records. 1995 to 2035 projections are U. S. Forest Service demand projections derived from historic use, and market area populations and projected future population estimates (except for the 1995 moose projection which is from Alaska Department of Fish and Game "Strategic Plan for Management of Moose in Region I, Southeast Alaska 1990-94, Public Review Draft").

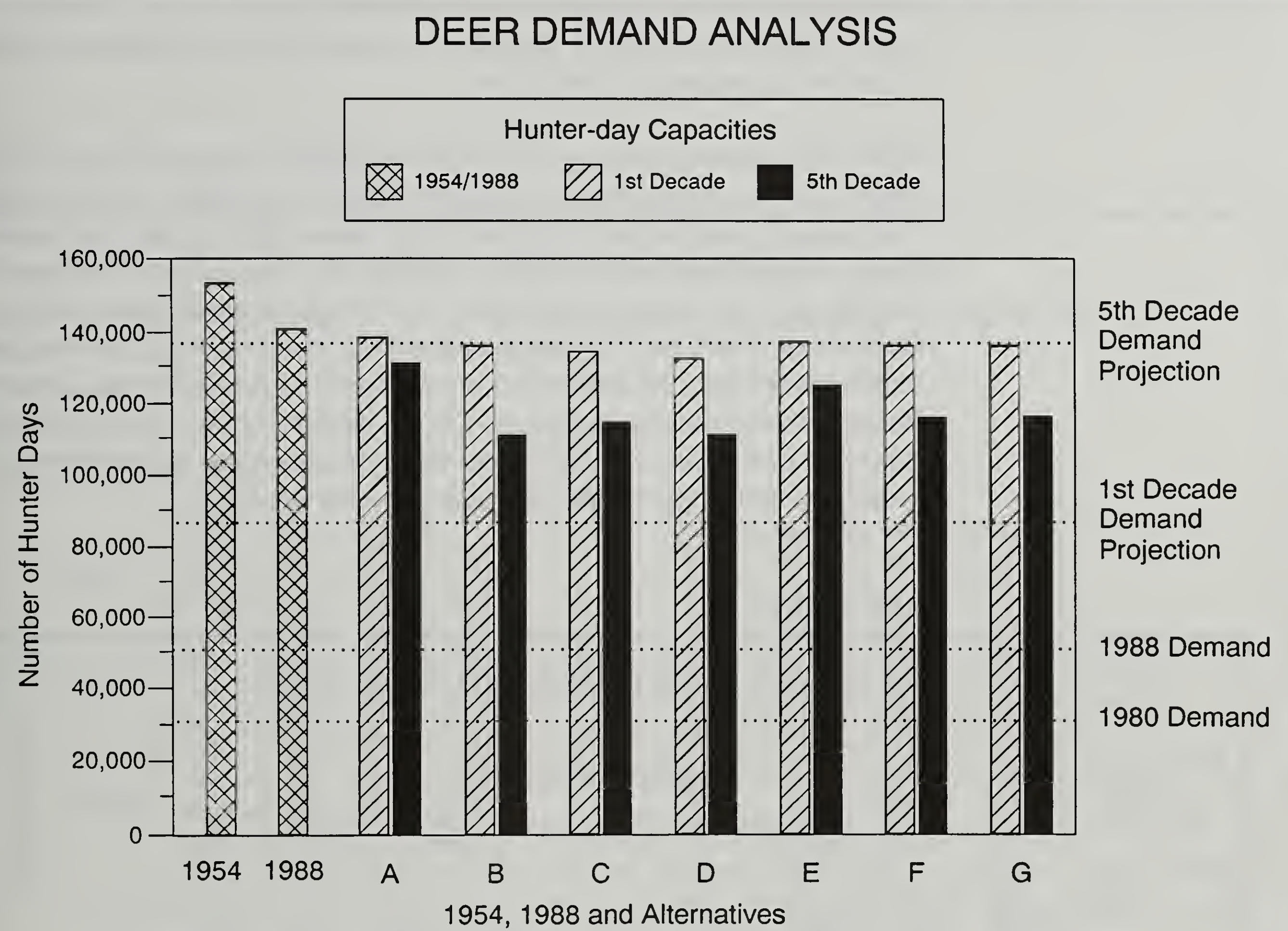
[1] Hunter day data for black bear and brown bear are for successful hunters only; the number of hunter days for unsuccessful hunters in unknown.

[2] Numbers in brackets ( ) are 95 percent confidence intervals for the projected demands for deer, black bear, and brown bear.

Deer. The capacity (capability) of the Forest to provide for the projected deer hunter-day demand was evaluated using the estimated winter habitat capabilities for each alternative and the harvest data collected by the Alaska Department of Fish and Game. The following approach was used: A 1.1 annual finite rate of increase was applied to the estimated winter habitat capabilities for each alternative, which provided an estimate of the fall hunting population of deer (Flynn and Suring, 1989). A 10 percent harvest rate was then applied to the fall population of deer, which provided an estimate of how many deer could be harvested annually (Flynn and Suring, 1989). The number of hunter-days which could be provided with this predicted harvest was calculated using ADF&G deer hunting data from the 1980's. The deer hunting data previously presented for the 1980's probably represents what could be expected in any decade. Many factors influence deer numbers and hunting activity, including weather patterns, access, habitat capability, hunting success, etc. For the period 1980 through 1988 (excluding 1981) there were a total of 100,602 deer killed, and a total of 418,041 hunter-days, for an average of 4.2 hunter-days spent to harvest one deer. The average of 4.2 hunter days per deer harvested was then applied to the estimate of how many deer could be harvested annually for each alternative to provide a hunter-day capacity for the Forest.

Figure 3-76 displays the results of this analysis. In 1954, the hunter-day capacity of the Forest was 153 thousand hunter-days. In 1988, the hunter-day capacity of the Forest was 141 thousand hunter-days. In 1980 and 1988, 31,400 and 49,400 hunter-days were actually expended on the Forest in deer hunting. Demand for deer hunting could increase during the first decade to 83,300 hunter-days. All alternatives are estimated to provide for the projected demand during the first decade. By the 5th decade, deer hunting is projected to increase to 136,000 hunter-days. None of the alternatives are estimated to provide for this projected demand. However, preliminary results of the most recent deer harvest data may show that demand will level off at near 83,000 hunter-days.

FIGURE 3-76



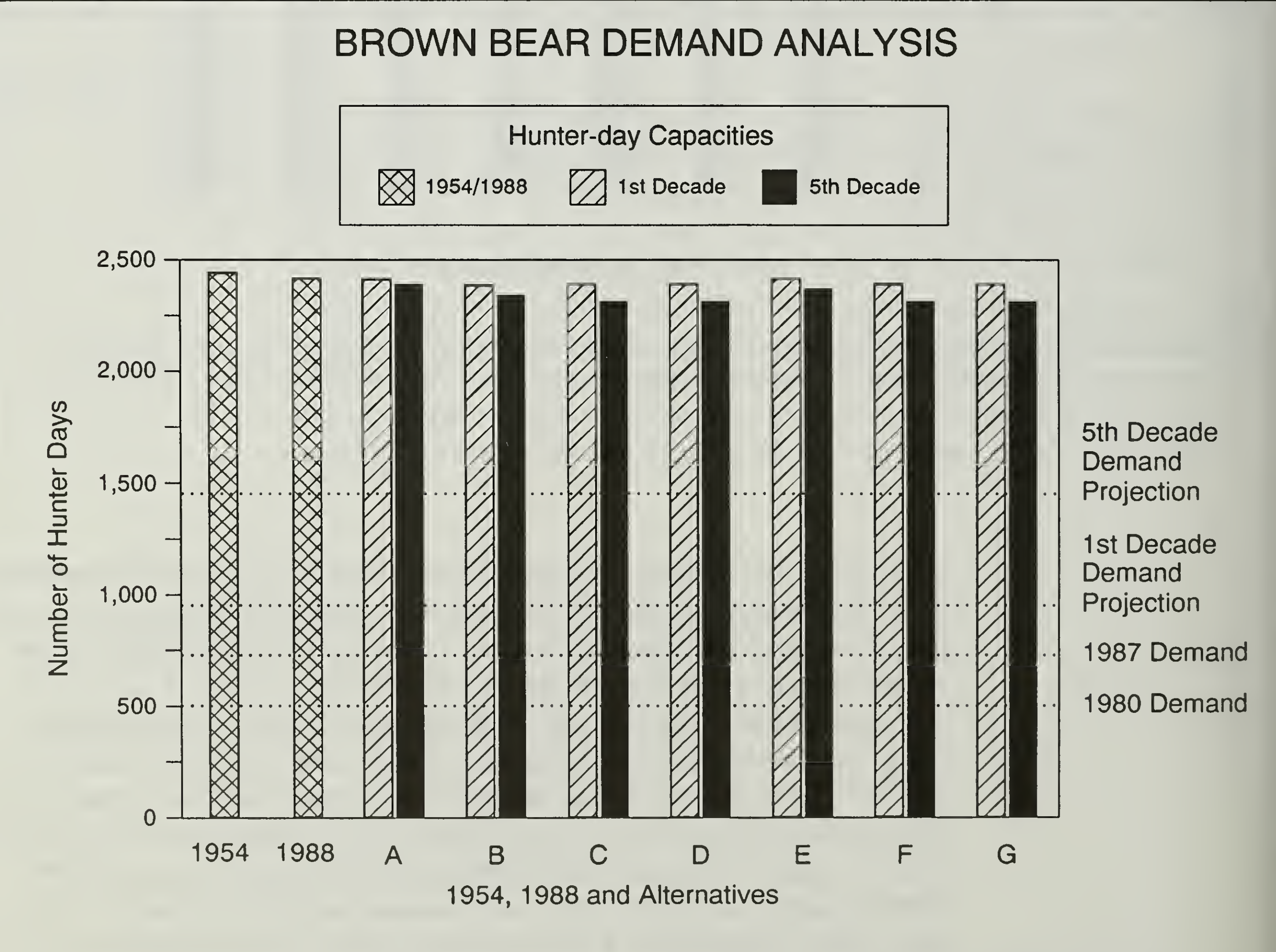
Source: ADF&G Records; F.S. Demand Projections; Revision Database QODHEIG, QODHEI5; F.S. Forplan Analysis

Brown Bear. The capacity (capability) of the Forest to provide for the projected brown bear hunter-day demand was evaluated using the estimated late summer habitat capabilities for each alternative and the harvest data collected by the Alaska Department of Fish and Game. The following approach was used: A five percent harvest rate was applied to the late summer habitat capability for brown bear, which provided an estimate of how many brown bear could be harvested annually. The number of hunter-days which could be provided with this predicted harvest was calculated using ADF&G brown bear hunting data from the 1980's. The brown bear hunting data previously presented for the 1980's probably represents what could be expected in any decade. For the period 1980 through 1987, there were a total of 900 brown bear killed, and a

total of 4,163 hunter-days by successful hunters, for an average of 4.6 hunter-days spent to harvest one brown bear by successful hunters. The average of 4.6 hunter days per brown bear harvested was then applied to the estimate of how many brown bears could be harvested annually for each alternative to provide a hunter-day capacity for the Forest.

Figure 3-77 displays the results of this analysis. The hunter-day capacities in Figure 3-77 are based on the vegetative habitat capabilities. In 1954, the hunter-day capacity of the Forest was 2,400 hunter-days. In 1988, the hunter-day capacity of the Forest was 2,410 hunter-days. In 1980 and 1987, 500 and 700 hunter-days were actually expended on the Forest in brown bear hunting. Demand for brown bear hunting is projected to increase during the first decade to 900 hunter-days. All alternatives are estimated to provide for the projected demand during the first decade. By the 5th decade, brown bear hunting is projected to increase to 1,400 hunter-days. All alternatives are estimated to provide for the projected demand during the 5th decade.

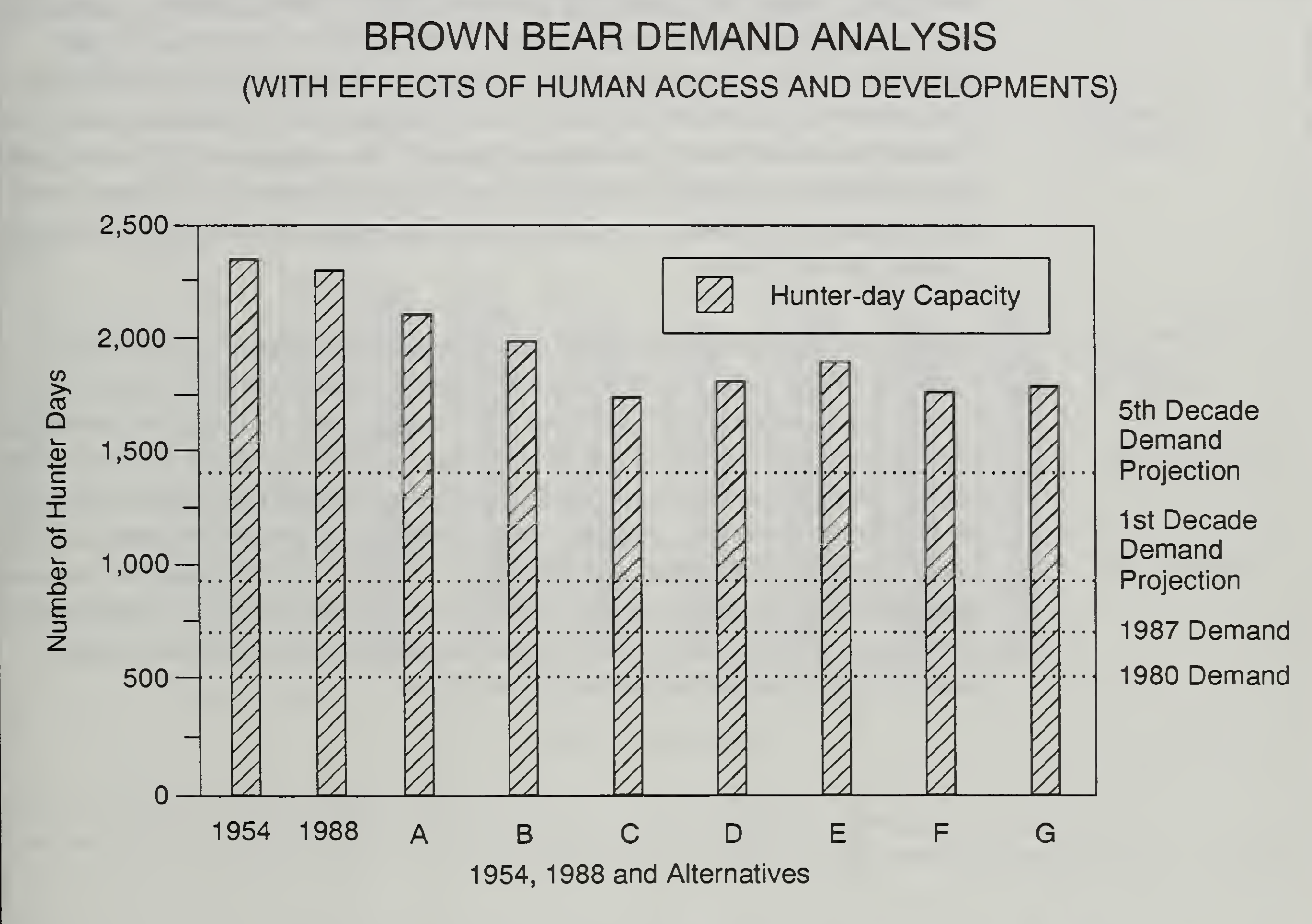
FIGURE 3-77



Source: ADF&G Records; F.S. Demand Projections; Revision Database QURARIG, QURARI5; F.S. Forplan Analysis

Figure 3-78 displays hunter-day capacities based on the vegetative habitat capabilities plus the potential effects of human access and developments. All alternatives are estimated to provide for the projected demand through the 5th decade.

FIGURE 3-78

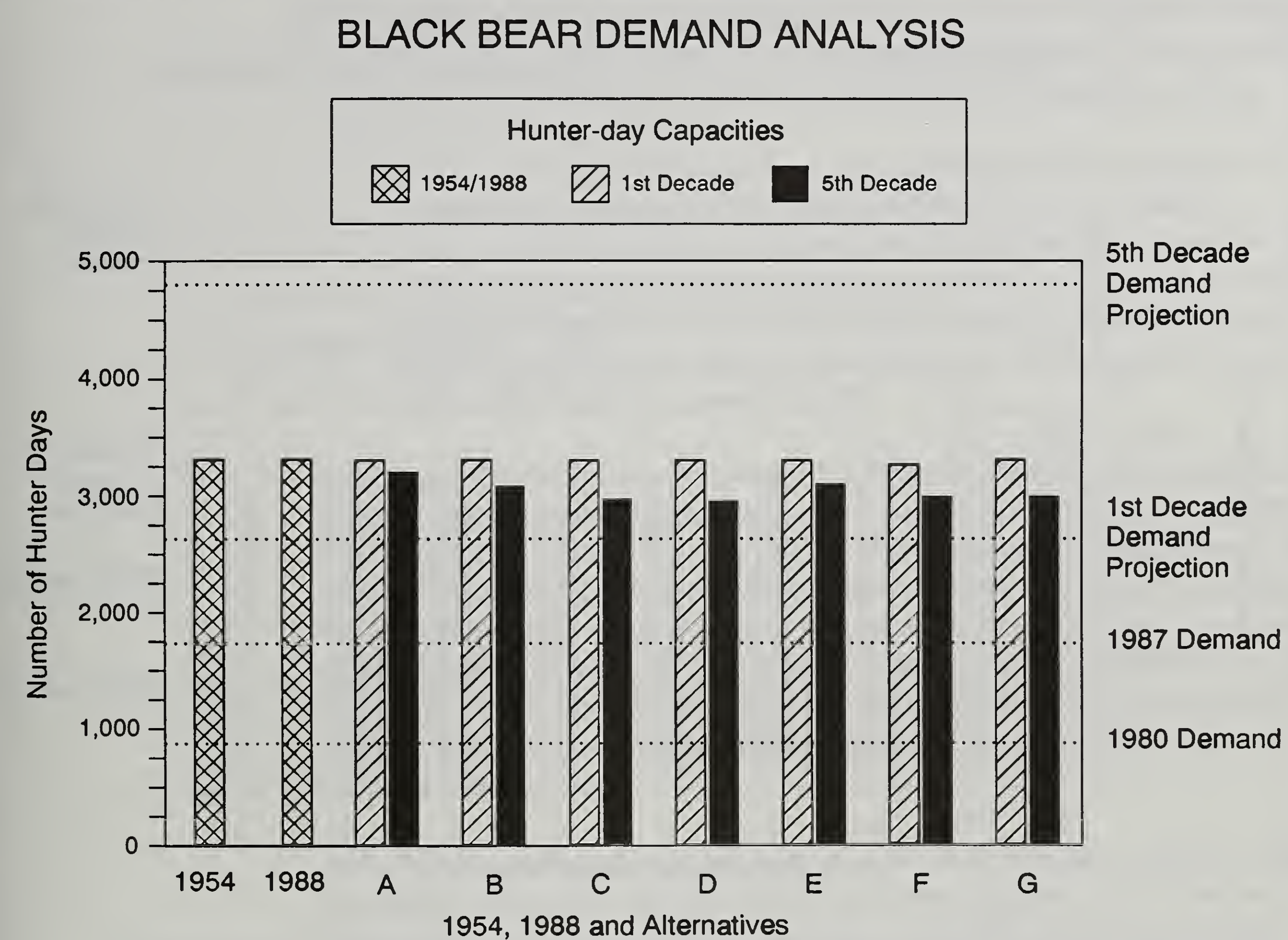


Source: ADF&G Records; F.S. Demand Projections; Revision Database QURARIG, QURARI5; F.S. Forplan Analysis

Black Bear. The capacity (capability) of the Forest to provide for the projected black bear hunter-day demand was evaluated using the estimated black bear habitat capabilities for each alternative and the harvest data collected by the Alaska Department of Fish and Game. The following approach was used: A seven percent harvest rate was applied to the habitat capability for black bear, which provided an estimate of how many black bear could be harvested annually. The number of hunter-days which could be provided with this predicted harvest was calculated using ADF&G black bear hunting data from the 1980's. The black bear hunting data previously presented for the 1980's probably represents what could be expected in any decade. For the period 1980 through 1987, there were a total of 2,891 black bears killed by hunters, and a total of 9,236 hunter-days by successful hunters, for an average of 3.2 hunter-days spent to harvest one black bear by successful hunters. The average of 3.2 hunter days per black bear harvested was then applied to the estimate of how many black bears could be harvested annually for each alternative to provide a hunter-day capacity for the Forest.

Figure 3-79 displays the results of this analysis. The hunter-day capacities in Figure 3-79 are based on the vegetative habitat capabilities. In 1954, the hunter-day capacity of the Forest was 3,300 hunter-days. In 1988, the hunter-day capacity of the Forest was 3,300 hunter-days. In 1980 and 1987, 800 and 1,700 hunter-days were actually expended on the Forest in black bear hunting. Demand for black bear hunting is projected to increase during the first decade to 2,600 hunter-days. All alternatives are estimated to provide for the projected demand during the first decade. By the 5th decade, black bear hunting is projected to increase to 4,800 hunter-days. The 5th decade demand projection exceeds even the 1954 habitat capabilities of the Forest.

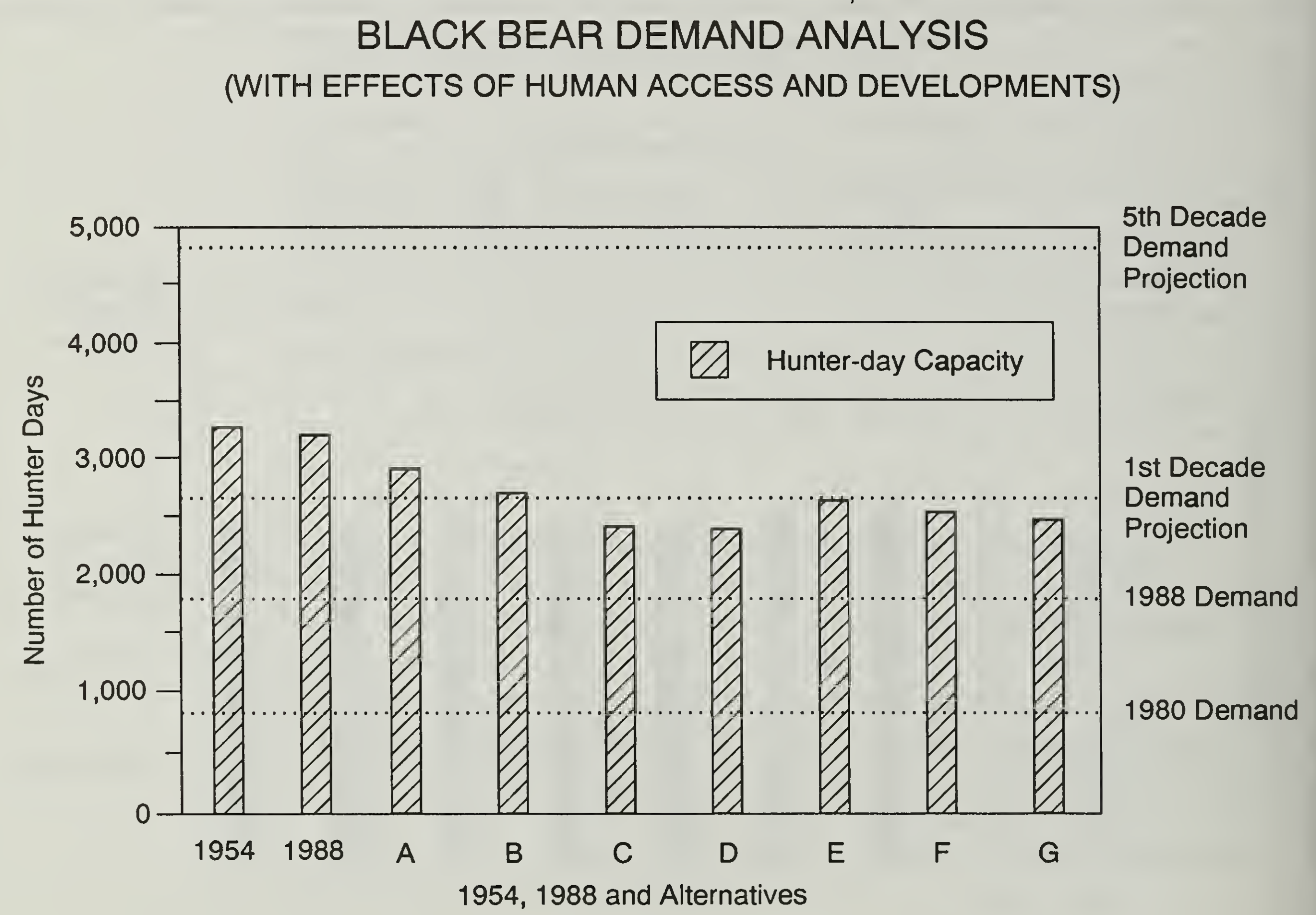
FIGURE 3-79



Source: ADF&G Records; F.S. Demand Projections; Revision Database QURAMIG, QURAMI5; F.S. Forplan Analysis

Figure 3-80 displays hunter-day capacities based on the vegetative habitat capabilities plus the potential effects of human access and developments. With the effects of human access and developments, alternatives A, B, and E are estimated to provide for the projected demand in the first decade. Alternatives C, D, F, and G are estimated to not provide for the first decade projected demand.

FIGURE 3-80



Source: ADF&G Records; F.S. Demand Projections; Revision Database QURAMIG, QURAMI5; F.S. Forplan Analysis

MITIGATION

Forest-wide Direction and Standards and Guidelines designed to maintain, enhance, or mitigate impacts on wildlife habitats and populations apply to all alternatives (see Appendix G). A brief summary of this direction and standards and guidelines is presented here: for the full direction, see Appendix G.

Old growth. Maintain old-growth habitat to provide for viable populations of old-growth dependent animal species, including desirable introduced species.

Access with Human Use. Cooperate with the State in regulating vehicle, boat, and other human use as necessary to achieve wildlife objectives, recognizing

the access provisions of ANILCA. Emphasis for reducing human disturbance will be given to high value habitat areas and during critical periods of wildlife use.

Deer Habitat. Provide the best possible habitat (vegetative) condition for Sitka black-tailed deer compatible with the management objectives of each management area. (Winter range is generally recognized as the limiting habitat component for deer populations.)

1. When planning projects, evaluate alternatives which would maintain large blocks of old-growth winter range habitat.
2. Use the deer winter habitat capability model to evaluate project alternatives.
3. Implement second-growth management practices in important wintering areas when techniques have been shown to be effective at providing winter habitat components (i.e. prolonging or maintaining winter forage providing thermal and escape cover).

Bald Eagle. The Bald Eagle Protection Act dictates that Bald Eagle habitat will be given special protection. An Interagency Agreement established with U.S. Fish and Wildlife Service provides management standards and guidelines. This includes: establishing and maintaining a minimum 330-foot (100-meter) radius (horizontal distance) eagle nest zone around each eagle nest tree; prohibiting all land use activity within eagle nest zones which would likely disturb the eagles; maintaining the eagle nest zone even though the nest or nest tree becomes inactive; and retaining trees suitable for use by eagles for nesting, feeding, roosting and perching.

Bear Habitat. Implement a Forest-wide program (in cooperation with the Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, Cities and Boroughs) with necessary regulations and projects which prevent habituation of bears to human foods/garbage and reduce chances of human/bear incidents.

Marine Mammals. Provide for the protection and maintenance of harbor seal, Steller sea lion and sea otter habitats.

Seabird Rookeries. Provide for the protection and maintenance of seabird (marine bird) rookeries.

Waterfowl Habitats. Maintain or enhance wetland habitats which receive high use by waterfowl species such as ducks, geese and shorebirds.

Snag/Cavity Nesting Habitat. Provide habitat for cavity-nesting wildlife species.

Moose Habitat. Develop habitat management direction for moose habitats.

Table 3-195 displays potential mitigation or enhancement projects for the first decade. About 140 thousand acres and 100 structures have been identified as potential wildlife projects during the first decade. About 126,000 of these acres (treatment of second growth timber stands and prescribed burning) are potential mitigation projects implemented following timber harvesting. The Forest and Region are currently monitoring and evaluating these types of mitigation measures to asses their effectiveness. The results of this monitoring will have an effect on how many acres are treated during implementation.

The browse treatments are primarily for improving moose habitats. The waterfowl projects include placement of artificial nest structures and burning of grass flats to improve forage conditions.

TABLE 3-195
POTENTIAL WILDLIFE MITIGATION OR ENHANCEMENT PROJECTS FOR THE FIRST DECADE[1]

Type of Project	*Chatham Area*	*Stikine Area*	*Ketchikan Area*	*Total*
Treatment of Second Growth Timber Stands[2]	2,300 Acres	9,700 Acres	109,500 Acres	121,500
Prescribed Burning[3]	1,000 Acres	1,270 Acres	2,800 Acres	5,070
Browse Treatments[4]	10,800 Acres	1,750 Acres	-	12,550
Waterfowl[5]	-	200 Acres	100 Structures	200 Acres/100 Structures

[1]Site-specific analysis and future increased knowledge pertaining to wildlife habitat mitigation and enhancement may alter the amount of acres actually treated.
[2]Includes precommercial thinning canopy gaps and other treatments of second-growth timber stands to improve understory forage production.
[3]Burning following clearcutting
[4]Includes burning, cutting or planting browse species.
[5]Includes nest structures and forage improvements.

ECONOMIC AND SOCIAL ENVIRONMENT

INTRODUCTION

Forest planning focuses on resource-related issues and assesses the environmental, social and economic impact of alternative management choices. To make this assessment, the various components of the environment which are affected must be identified. This section of Chapter 3 describes the social and economic environment which is affected by management of the Tongass National Forest. Additional information on the subject was prepared in April, 1978, in cooperation with the University of Alaska. Further documentation can be found in the *Socioeconomic Overview* (Planning Records).

Nearly 80 percent of Alaska's panhandle is within the Tongass National Forest, an area larger than the State of West Virginia. This area stretches roughly 500 miles from Ketchikan in the southeast, to Yakutat in the northwest, and is mainly unpopulated wild country. Presently, only about 65,000 people live in 33 towns, communities and villages located in or very near the boundaries of this, the largest Forest in the National Forest System.

The economies of most communities in Southeast Alaska depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, tourism, recreation, timber harvesting, mining and subsistence uses. There is very little private land to provide these resources. Consequently, maintaining the abundant natural resources found on the Tongass concern those who make their living here.

In addition to economic activity, the quality of people's lives is greatly enhanced by the physical environment associated with the Tongass. To many, Southeast Alaska is viewed as what America was like two hundred years ago. Alaska has always been known as a wild and magnificent place, a vast expanse of seemingly limitless scenery and vast natural resources. People who live here and people who have never even seen Alaska think of it as "The Last Frontier."

Many Southeast Alaskans want to keep that which makes their part of the world unique. At the same time, they want to continue maintaining their economic livelihood. With a limited resource base, resolution of this conflict is increasingly difficult.

A look at current and expected future conditions in areas influenced by the Tongass National Forest will be useful to project possible changes in social and economic sectors that would result from implementing an alternatives.

AREA OF INFLUENCE

The area or zone of Tongass National Forest influence was established by identifying users of the Forest's resources. Major resources of the Tongass include recreation opportunities, fish and wildlife, timber, minerals, and water. Each re-

source is used, processed or consumed by different, though overlapping, segments of the population located in varying proximity to the Forest. The area for this analysis has been separated into a primary influence area and a secondary influence area.

The primary influence area for the Tongass National Forest is Southeast Alaska. Local residents make up 2.2 million of the 2.8 million recreation visitor days that occur annually on the Tongass. In 1988, fisheries provided about 3,400 jobs with earnings of nearly $74 million (unpublished report from Forest Service IPASS Model Analysis, December 1988). Rural Southeast Alaska residents harvest fish and wildlife resources for subsistence purposes. Most of the timber sold from the Tongass National Forest is processed by mills in Southeast Alaska. The largest silver mine in North America is on Admiralty Island at Greens Creek in Southeast Alaska. Eighteen Southeast Alaska communities draw their water from the Tongass National Forest for domestic use as do several logging camps, fish hatcheries, resorts, mines, and canneries.

The secondary influence area for the Tongass National Forest stretches north and west to include the entire state of Alaska; other Pacific Northwest states especially, Washington, Oregon, and California; British Columbia; and, Pacific Rim countries, especially Japan. Discussion in this document focuses on the primary area of influence and only briefly addresses the secondary area.

HISTORIC SOCIAL TRENDS

Southeast Alaska's society is influenced by a variety of cultures, from its earliest peoples to its most recent inhabitants. The abundant resources of the forest and waters have provided food, shelter, and livelihood to its inhabitants for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment, and were able to subsist on the regions natural resources and develop a rich culture. The numerous waterways allowed for mobility which aided in expanding trade and gathering food.

In the 1700's, the Russians began exploration in Alaska. The fur trade, primarily sea otter pelts, was the main force driving European colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in her North American colony. Alaska was then sold to the U.S. in 1867.

As colonization continued with the U.S. occupation, new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast. During that same period, the discovery of gold brought thousands of miners to the area, many of whom were then followed by their families. The most important of the early discoveries occurred in Juneau. In the 1920's and 1930's, the Depression brought a decline in fish prices and mining employment. The impact of World War II resulted in the closures of the last remaining mines.

The timber resources were utilized by the earliest inhabitants for shelter, heat, utility, and cultural purposes. The Russians also harvested timber for building ships and structures, but commercial timber harvest did not develop until the 1900's. In the earlier part of the century, small timber mills were operated in a few communities, but it was not until the mid twentieth century, that the timber industry became a major social and economic factor in Southeast Alaska, with the development of two large-scale pulp mills in Ketchikan and Sitka.

In the 1950's Alaska focused its attention on statehood. On January 3, 1959, President Eisenhower signed the proclamation establishing Alaska as our 49th state. The resultant economic shift towards more government employment and an expanding timber industry had implications beyond changes in population levels and distribution. It was a shift towards a diversified economy, with less dependence on extractive and nonrenewable resources, and away from a seasonal economy.

Today, most of the population of Southeast Alaska is concentrated in several urban communities, the largest of which are Juneau, Ketchikan, Sitka and Petersburg. The same industries which dominated Southeast Alaska's history: fishing, mining, and timber production, are still prominent industries in most of the urban communities. In addition, tourism, which has increased in its economic importance over the past several years, provides a major source of income to the economies of all communities. Government, especially in Juneau, transportation, and education are also significant sources of income. There are numerous small, rural communities as well, which depend primarily on fishing, timber production, and subsistence for their livelihoods.

EMPLOYMENT AND INCOME

AFFECTED ENVIRONMENT

Southeast Alaska's economy is characterized by its dependence on four major industries, lumber and paper products, commercial fishing, tourism, plus mining and mineral development.

TIMBER INDUSTRY

Southeast Alaska's forest product mix includes dissolving pulp, logs, cants, dimension lumber and woodchips. The industry's structure has changed significantly over the last ten years. In 1980, the industry was focused on processing timber from the Tongass National Forest into cants and dissolving pulp. The sawmilling industry processed primarily large-diameter spruce logs. They were sawn just enough to meet the minimum federal standards for export. The smaller or defective spruce logs and most of the hemlock logs were chipped for pulping.

Today, the forest products industry in Southeast Alaska processes a wide spectrum of spruce and hemlock diameter logs into finished lumber products. The wood wastes from the sawing process are chipped for sale. In addition, a new market in Asia has developed for logs from lands conveyed to Alaska Native Corporations through the Alaska Native Claims Settlement Act (P.L. 92-203). Unfortunately, this structural change was painful to employees and costly to local industry. Between 1981 and 1985, total employment in the lumber and pulp mills dropped 29 percent and a number of the older and more inefficient sawmills were abandoned. However, after this structural change, the industry rebounded as market conditions improved and increased direct employment to 3,516 jobs in 1989, up 81 percent from the low in 1985 and 19 percent above the previous high in 1981.

Because most of Alaska's forest products are exported, fluctuations in timber markets are primarily a function of the international marketplace and do not reflect activities of the region. In spite of these challenges, in 1989 the industry provided almost 16 percent more total employment than it did in 1980.

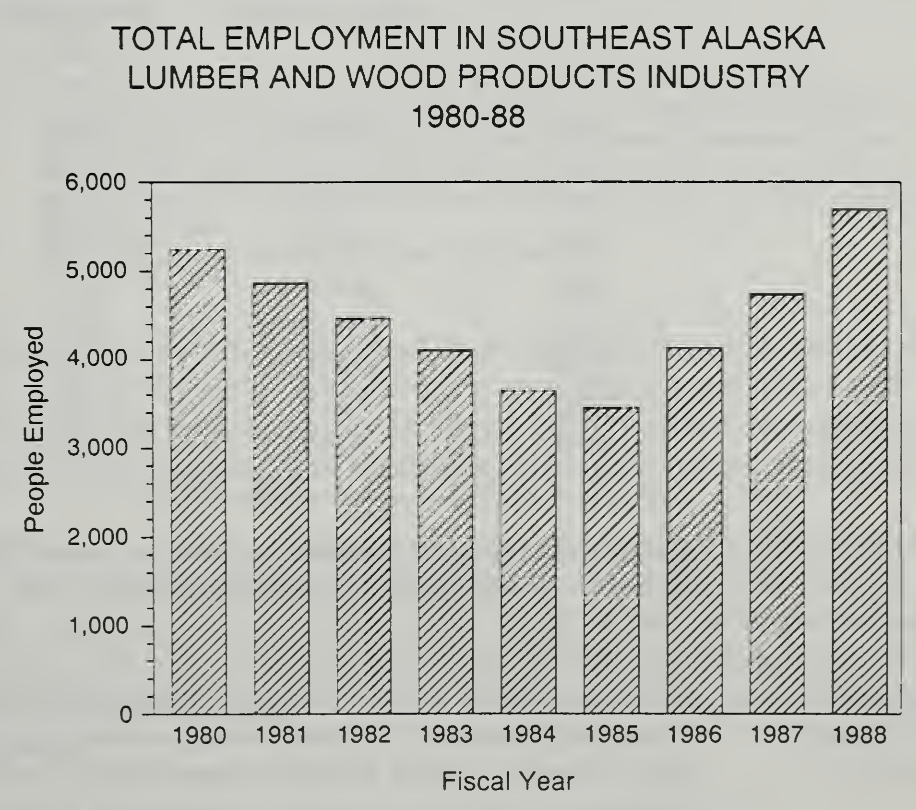
A constant supply of Tongass timber is not the only factor controlling timber employment. Other controlling factors include exchange rates, the overall Pacific Rim demand for wood fiber and competitiveness of timber suppliers outside the Tongass National Forest. The historic timber industry employment in Southeast Alaska is shown in Table 3-196 and Figure 3-81.

TABLE 3-196
TIMBER INDUSTRY EMPLOYMENT IN SOUTHEAST ALASKA

Year	Direct Employment (Jobs)	Total Employment (Job)s
1980	2,949	5,249
1981	2,733	4,858
1982	2,506	4,456
1983	2,293	4,093
1984	2,041	3,641
1985	1,947	3,447
1986	2,342	4,167
1987	2,790	4,740
1988	3,341	5,691

Source: Alaska Department of Labor, USDA Forest Service IPASS Analysis.

FIGURE 3-81



Source: USDA Forest Service Alaska Region R10-MB-55
Timber Supply and Demand Report Draft 1988.

COMMERCIAL FISHING

Although the commercial fisheries industry in Southeast Alaska continues to fluctuate, it remains a major component of Southeast's economy. Salmon stocks recovered from their low levels in the early 1970's. Salmon continues to dominate the industry, both in the volume and value of catch, and in harvest-related employment. The labor force and employment associated with fishing is highly seasonal.

Table 3-197 shows that fish harvest employment remained relatively stable between 1979 and 1984, largely because Alaska's commercial fisheries have become increasingly regulated. In the case of salmon, a permit system regulates the number of harvesters accessing the fishery, or, in the case of halibut, harvest is regulated through limited openings or seasons.

Seafood processing, also a vital component of Southeast's economy, has undergone some changes since 1980. Of major significance were an increased use of floating fish processing facilities, and a trend toward frozen rather than canned salmon.

TABLE 3-197
FISH HARVESTING AND EMPLOYMENT IN SOUTHEAST ALASKA

Year	Salmon Harvest (1000 pounds)	Direct Employment (Jobs)	Total Employment (Jobs)
1980	93,027	3,475	4,700
1981	110,718	3,142	4,267
1982	122,991	3,332	4,507
1983	155,676	3,078	4,178
1984	154,846	3,277	4,452
1985	231,024	3,450	4,675
1986	214,997	3,500	4,750
1987	73,532	3,600	4,875
1988	90,696	3,500	4,725

Source: Alaska Commercial Fisheries Entry Commission, Alaska Department of Labor, Research and Analysis Section, USDA Forest Service IPASS analysis March 1990.

RECREATION AND TOURISM INDUSTRY

During the 1980's, tourism became a major industry in Southeast Alaska. Cruise-ships traveled the Inside Passage making regular stops at Southeast ports in record numbers. Between 1980 and 1986, cruiseship passenger numbers increased by nearly 90 percent. Total visitors to Southeast Alaska grew from

205,000 in 1983 to 350,000 in 1986 . The tourist season also expanded to include much of May and September. Its economic significance is likely to increase.

TABLE 3-198
RECREATION AND TOURISM FOR SOUTHEAST ALASKA

Year	Southeast Cruiseship Passenger Numbers [1]/	Southeast Ferry System Use [2]/	Airline Departure Juneau [3]/	Scenic Flight Passengers Misty Fiord [4]/
1975	46,279	230,000	110,660	NA
1980	86,815	276,000	155,699	3,000
1981	83,566	282,000	156,257	6,300
1982	87,358	300,000	150,871	5,200
1983	99,706	308,000	167,302	5,300
1984	118,781	311,000	168,685	7,000
1985	137,005	313,000	163,837	12,000
1986	164,400	296,070	156,667	11,900
1987	202,000	326,644	157,952	12,200
1988	198,870	344,209	167,314	NA

[1]/ From U.S. Customs Data as collected by McDowell Group, Juneau, Alaska.

[2]/ From Doug Burton, Alaska Marine Highway Program - Traffic Division (465-3946), Annual Traffic Reports - "*Traffic Volumes by Port*" Represents Boarding Passenger numbers.

[3]/ From Juneau Airport Manager's Office (789-7821). Represents departing passenger numbers. Only a fraction are tourists. Included as an indication of visitation - business or pleasure - to Southeast Alaska.

[4]/ From Misty Fiords National Monument (225-2148).

Marketing studies by the Alaska Division of Tourism indicate that "scenery, forest, mountains, out-of-doors" and "wilderness, unspoiled, rugged" were the top interests appealing to potential visitors (Bright 1985). Resident recreation also increased during the 1980's as indicated by fishing and hunting license sales.

Unlike other industries, the tourism and recreation "industry" is not a single industry, but a composite of many that serve more than tourists. For example, retail trade, service, and transportation serve tourists as well as local industries and residents. The labor force and employment associated with tourism and recreation are different than manufacturing. The jobs tend to be highly seasonal and low paying.

TABLE 3-199
RECREATION AND TOURISM EMPLOYMENT IN SOUTHEAST ALASKA

Year	Direct Employment (Jobs)	Total Employment (Jobs)
1980	2,100	3,000
1981	2,200	3,125
1982	2,300	3,250
1983	2,400	3,400
1984	2,500	3,550
1985	2,600	3,675
1986	2,700	3,825
1987	2,800	3,925
1988	2,750	3,900

Source: USDA Forest Service IPASS Analysis, March 1990.

MINING AND MINERAL DEVELOPMENT

Mineral exploration and mining have been a part of life in Southeast Alaska for over 120 years. Today, the mining industry is exploring new areas for potential mineral deposits and is revisiting historic mining areas using modern exploration techniques. There are 13 identified mineral deposits on the Tongass National Forest that appear economically viable for development under today's market conditions. The present net value of these 13 deposits is estimated at 25.6 billion dollars. Today, mining development activities are centered primarily on the Quartz Hill molybdenum site in Misty Fiords and the Greens Creek silver and gold mine on Admiralty Island.

The Quartz Hill molybdenum deposit was discovered in 1974 and is considered to be one of the largest such deposits in the world, containing as much as 10 percent of the free world's know reserves. Molybdenum is used as a hardening agent in the production of steel. When fully operational, the mine is expected to produce 80,000 tons of ore per day through an open pit mine operation, and will employ 850 to 900 people, most of whom will commute from Ketchikan. Expected life of the mine is predicted to be a minimum of 70 years.

The Greens Creek project is a major metals mine containing silver, gold, zinc and lead on the northwest end of Admiralty Island, approximately 18 miles from Juneau. Exploration of the site began in 1973 and the mine has been fully operational since 1989. Greens Creek is the largest silver mine in North America, producing up to 1,000 tons of ore per day. The mine has an estimated life in excess of 10 years and employs about 225 people who commute from Juneau.

Prospects for Southeast Alaska's mining industry appear to be positive for precious metals, however, much will depend on whether the strength of world prices can support Alaska's high exploration, development and production costs.

Employment and wages of the four largest industries in Southeast Alaska affected by the Tongass are summarized for the years 1980 through 1989 in Table 3-200. Overall employment increased between 1980 and 1988 by nearly 14 percent, after falling slightly during the mid eighties due primarily to a depression in the timber market.

TABLE 3-200
TOTAL EMPLOYMENT GENERATED BY MAJOR INDUSTRIES IN SOUTHEAST ALASKA

Year	Timber Industry (Jobs)	Fishing Industry (Jobs)	Rec. and Tourism Industry (Jobs)	Mining & Mineral (Jobs)	Total
1980	5,249	4,700	3,000	170	13,119
1981	4,858	4,267	3,125	80	12,330
1982	4,456	4,507	3,250	80	12,293
1983	4,093	4,178	3,400	150	11,821
1984	3,641	4,452	3,550	160	11,803
1985	3,447	4,675	3,675	180	11,977
1986	4,167	4,750	3,825	160	12,902
1987	4,740	4,875	3,925	280	13,820
1988	5,691	4,725	3,900	600	14,916

Source: Alaska Commercial Fisheries Entry Commission; Alaska Department of Labor, Research and Analysis Section; USDA Forest Service IPASS Analysis, March 1990.

EMPLOYMENT AND INCOME

ENVIRONMENTAL CONSEQUENCES

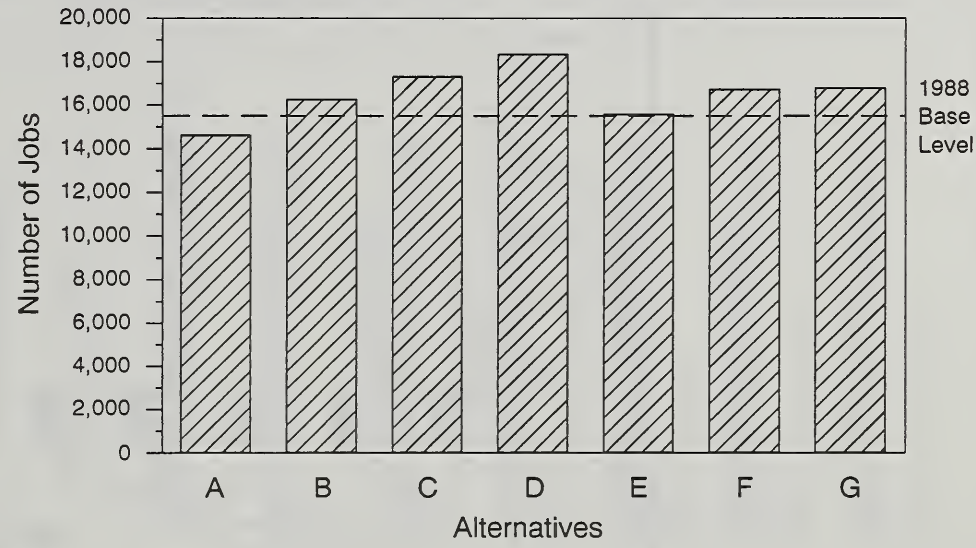
The mix and level of goods and services provided in each alternative has the potential to affect the number of jobs throughout Southeast Alaska. In estimating job impacts it is assumed that other supply and demand factors affecting "markets" for Forest products and uses remain constant. This assumption becomes more tenuous the further out in time projections of effects are made. For example, the amount of timber offered for sale by the Tongass is not, and will never be, the only factor that affects the number of timber industry jobs. Worker productivity, interest rates, import and export levels, production and shipping costs, regional competition, private and public land harvest levels and policies, and other factors all affect the supply of and demand for timber and the subsequent number of jobs. Therefore, the focus of this analysis is on the comparison of potential first decade changes in the number of jobs for each alternative relative to a base historical level.

The number of jobs associated with each alternative was estimated using an input-output model called Interactive Policy Analysis Simulation System, or IPASS for short. In this model, estimates are a function of changes in final demand resulting from changes in output levels. Changes in output or activity levels initiate expenditures in various sectors of the local economy which trigger the change in jobs (and income). On the Tongass, job and income effects are based on changes in the amount of timber volume harvested, recreation use, hunting and fishing use, commercial fishing, and areas open to mineral entry.

To estimate the potential changes in jobs and income associated with each alternative, a base level was established for each output. The base level year is 1988 and the number of total jobs provided that year was 15,544. Figure 3-82 displays the total number of jobs for each of the seven proposed alternatives. Alternative D would provide the greatest number of job opportunities estimated at 18,350 while Alternative A would provide the fewest job opportunities with 14,650. All alternatives except A provide total jobs opportunities in excess of the 1988 base year level. However, this is not the case when individual resource sector jobs are compared to base year levels.

FIGURE 3-82

AVERAGE ANNUAL NUMBER OF JOBS ASSOCIATED WITH FOREST RESOURCES OVER THE NEXT TEN YEARS

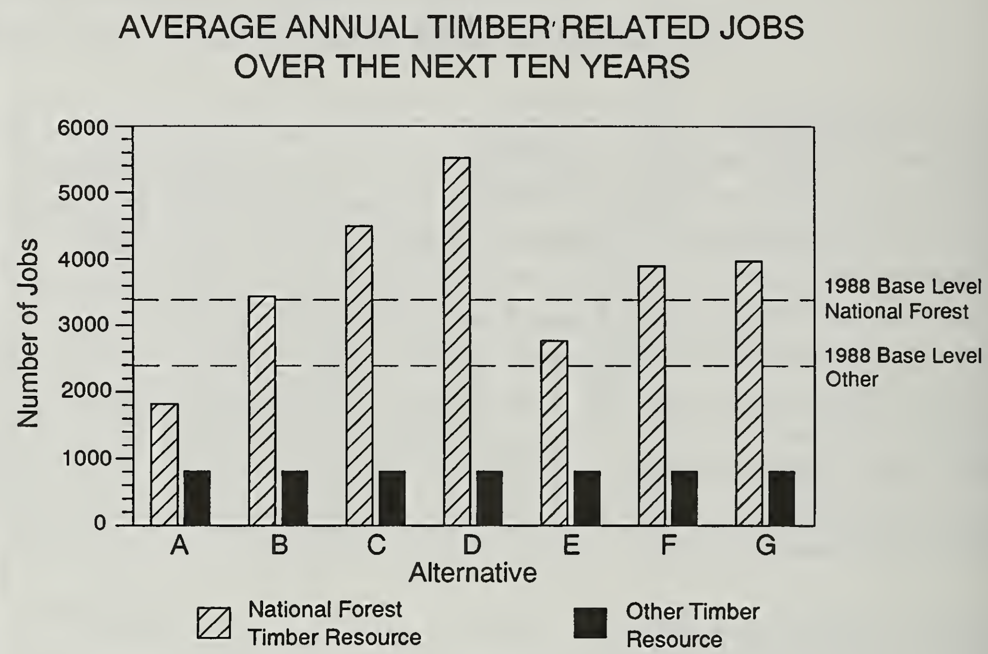


Source: Forest Service IPASS Analysis, March - 1990

Across all alternatives, commercial fishing, recreation and tourism, and mining and mineral development jobs are estimated to exceed base year levels by 135; 1,514; and, 500 jobs, respectively. Timber related jobs do not respond similarly.

Because of the predicted decline in timber harvest on state and private land, timber related jobs associated with lands not Federally owned are estimated to fall beneath base year levels by 1,474 jobs in all alternatives. National Forest related timber job opportunities fluctuate above and beneath base year levels depending on the alternative as shown in Figure 3-83.

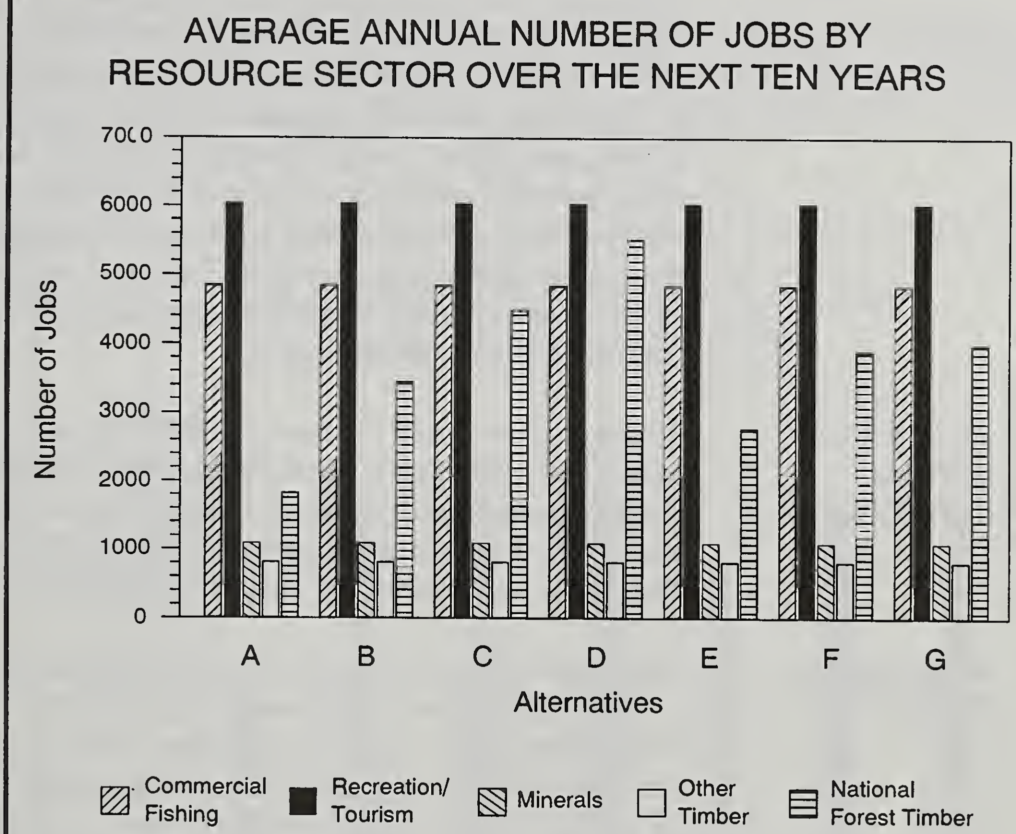
FIGURE 3-83.



Source: Forest Service IPASS Analysis, March - 1990

While the total number of job opportunities changes for each alternative, the number of jobs related to some resource sectors do not vary between alternatives. More specifically, the number of jobs related to commercial fishing, recreation and tourism, mining and mineral development, and non-Federal timber show consistent changes in each alternative (Figure 3-84). Unlike these resource sectors, jobs related to timber harvesting on the National Forest vary by alternative.

FIGURE 3-84



Source: Forest Service IPASS Analysis, March - 1990

COMMERCIAL FISHING

In estimating jobs associated with commercial fishing, the assumption is that two-thirds of the total fish production in Southeast Alaska is salmon and that 80 percent of the salmon originate from National Forest lands. The result is that 2,505 of the 4,727 current jobs related to commercial fishing are assumed attributable to the Tongass. It is also assumed that these 2,505 jobs change at the same rate as the commercial fish habitat capability on the Forest. Timber harvest and related activities have no measurable effect on fish under the current standards and guidelines and management area prescriptions (Chapter 3, Fish). Commercial fish habitat capability increases from 111 million pounds to 117 million pounds (5 percent) in the mid-1990's in all alternatives due to assumed construction of scheduled fish enhancement projects during the 1990's. Consequently, commercial fish related jobs attributable to the Tongass are estimated to increase from 2,505 to 2,640 jobs in all alternatives. Commercial fish job opportunities not attributable to the Tongass are assumed to remain constant. Total job opportunities related to commercial fishing are estimated at 4,850 (rounded to the nearest 25 jobs) in all alternatives.

RECREATION AND TOURISM

Recreation and tourism jobs were derived from the 1988 base year IPASS model by the Pacific Northwest Experiment Station (PNW) and include sport hunting and fishing jobs. The Station used results from a 1988 visitor survey conducted in Southeast Alaska by Data Decision Group, Inc. for recreation and tourism jobs. Results from the Juneau Sport Fish Study conducted by Jones and Stokes Associates in Juneau, Alaska were used for sport fishing jobs. PNW used results from a 1988 hunter survey conducted by Alaska Department of Fish and Game for hunting related jobs. Future recreation and tourism, sport hunting and fishing jobs are projected to change at the same rate as future use. The increase in projected use is 27 percent for recreation and tourism, 36 percent for sport fishing, and 53 for hunting related jobs during the 1990's. Consequently, total recreation and tourism related jobs are estimated to increase to about 6,050 jobs (rounded to the nearest 25 jobs) in all alternatives.

MINING AND MINERAL DEVELOPMENT

Mining employment for the base year (600 jobs) were derived from the 1988 base year IPASS model by the Pacific Northwest Experiment Station. The U.S. Bureau of Mines projects that mining jobs will likely increase to 1,100 in the 1990's. This total is reflected in all alternatives since the identified economically viable mineral deposits are open to mineral entry in all alternatives or have valid existing rights.

NON-FEDERAL TIMBER

Timber harvesting from state and private land was 421.3 million board board feet in 1988 (*1988 Timber Supply and Demand Report)*. The *Alaska Timber Markets Study* indicates that harvest from these sources will decline about 64 percent during the 1990's. It is assumed that jobs generated from this harvest will decline by the same percentage leading to a fall in non-Federal timber related jobs to about 825 (rounded to the nearest 25 jobs) in all alternatives.

NATIONAL FOREST TIMBER

National Forest timber related jobs for the base year were taken from the 1988 *Timber Supply and Demand Report*. Future timber employment is based on 8.64 logging, sawmill, and pulpmill jobs per million board feet used in the most recent *Timber Supply Program Information Reporting System*. Timber employment is derived by multiplying 8.64 by the total timber sale program (allowable sale quantity and utility volume) which is different for each alternative. This explains why National Forest timber related jobs vary by alternative while other resource sector jobs remain constant. National Forest timber related job opportunities would likely meet or exceed the 1988 base level in Alternatives B, C, D, E1, F, F1, G, and G1. Alternatives A and E fall below the 1988 base level.

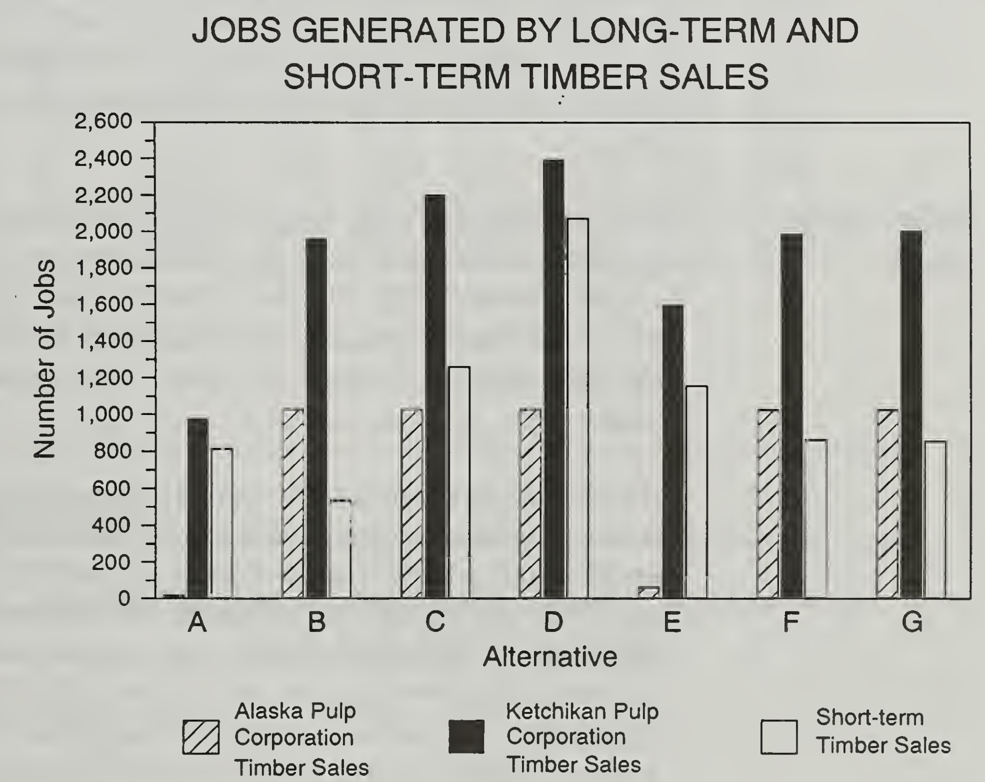
LONG TERM SALES

Long-term timber sale contracts were established in the 1950's to attract the timber industry and stable jobs to Alaska. Two of the original four long-term contracts still operate on the Tongass and are held by Ketchikan Pulp Company (KPC) and Alaska Pulp Corporation (APC) (Chapter 3, Timber). Maintenance of existing contracts depends on the amount of timber volume scheduled within existing contract area boundaries. The KPC contract provides an annual net sawlog and utility log volume of 192 million board feet and the APC contract

provides an annual net sawlog log volume of 104 million board feet with an additional 15 million board feet of utility volume. More than 2,600 timber related jobs are associated with the two long-term contracts.

Alternative C reflects the Current Plan allowable sale quantity while Alternative D would increase the available timber supply about 20 percent. Figure 3-85 displays the range of job opportunities in the alternatives related to the timber industry.

FIGURE 3-85



Source: Forest Service IPASS Analysis, March - 1990

Although there is some reduction in the available timber supply in Alternatives B, E1, F, F1, G, and G1, long-term contract requirements could be met in these alternatives, but would likely affect jobs associated with the independent and small business set aside program and could lead to a change in installed the mill capacity infrastructure (Figure 3-85).

Alternatives A and E will result in cancellation or a significant modification of the long-term contracts. Timber supply would likely decline by about 100 and 37 million board feet in the KPC contract sale area, respectively. Similarly, timber supply in Alternatives A and E would decline by about 100 million board feet, in the APC contract sale area. This could result in mill closures, particularly for the APC mill in Sitka, and would result in a reduction of jobs (Figure 3-85).

The allowable sale quantity in Alternative E (280 million board feet) is insufficient to maintain the APC mill in Sitka. With an increase of 369,000 suitable acres of forest lands, an allowable sale quantity of 378 million board feet is attainable. This would provide the opportunity to sustain both pulpmills (See Chapter 3, Timber for analysis on increasing volume in Alternatives E, F, and G).

Alternatives F and G incorporate the land allocation objectives outlined by the Southeast Conference. One of the Conference's objectives was that up to 450 million board feet of timber be made available for harvest each year. Alternatives F and G have allowable sale quantities of 389 and 390 million board feet, respectively under a maximum present net value objective. Higher allowable sale quantities are attainable in both alternatives by increasing investments in the timber program which would generate corresponding job increases (Alternatives F1 and G1).

SHORT-TERM SALES

Between 1980 and 1989, annual average harvest for short-term sales was about 82 million board feet of sawlogs and an additional 12 million board feet of utility volume (Revision DEIS, Chapter 3, Timber). About 50 percent of the sold short-term volume has been purchased through the Small Business Association (SBA) set aside program (Chapter 3, Timber). This translates into about 812 timber related jobs.

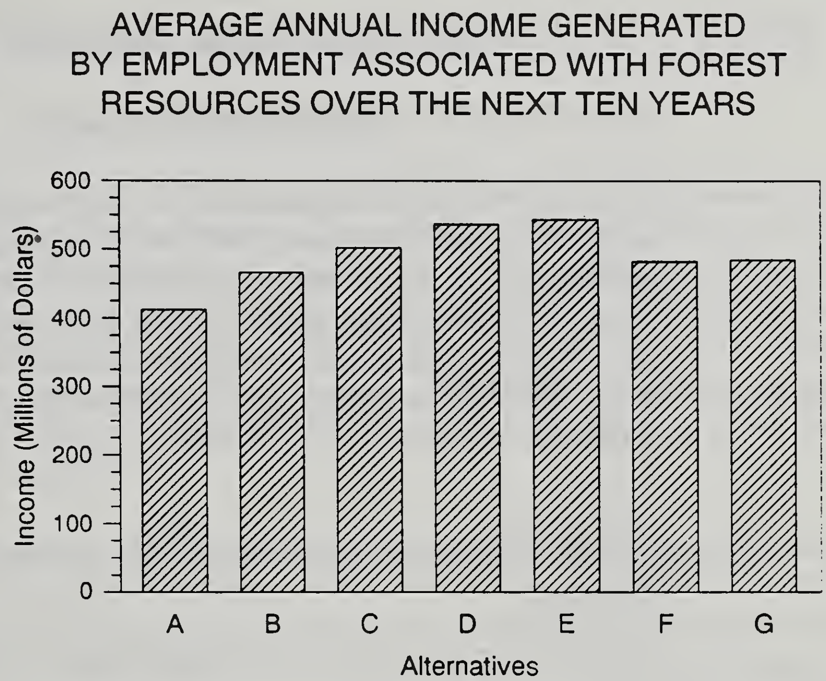
The alternatives would provide a range in timber supply from 52 million board feet of sawlog volume in Alternative B to 208 million board feet in Alternative D. This would, in turn, provide a range of about 500 to 2,000 timber related job opportunities. Under current high market conditions, there has been significant interest in increasing mill capacity. Only Alternative D would provide and adequate supply to support additional mill capacity. Alternatives C, E1, F, F1, G, and G1 would support a program similar to that experienced during the 1980's. Alternative B is inadequate to maintain existing short-term timber sales and associated jobs. All other alternatives supply sufficient timber volumes to maintain or slightly increase job opportunities related to short-term timber sales.

INCOME

Average annual income was estimated for the first decade using the IPASS model. Figure 3-86 shows that Alternatives C, and D have the highest income level potential with each exceeding $500 million. Alternative A displays the lowest income with $413 million.

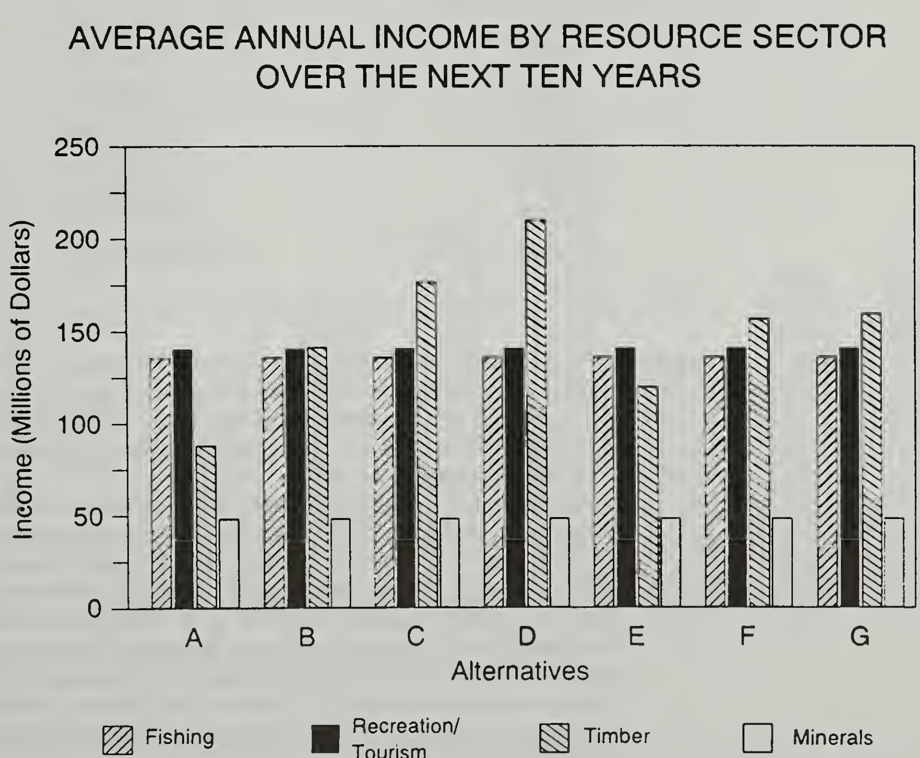
As with total jobs, only total income related to levels of timber harvest changes across all alternatives (Figure 3-87). Alternative D provides the greatest opportunity for timber related income with $209 million and Alternative A the least with $87 million.

FIGURE 3-86



Source: Forest Service IPASS Analysis, March - 1990

FIGURE 3-87



Source: Forest Service IPASS Analysis, March - 1990

NET CASH FLOW / PAYMENTS TO STATES

AFFECTED ENVIRONMENT

Table 3-201 shows the total receipts from the Tongass timber program and payments to the State of Alaska. With few exceptions, 25 percent of all monies received (including purchaser road credits) from the Tongass is paid to the State of Alaska. The funds are used to benefit public schools and public roads. The amount of funds contributed in the past have not comprised a significant portion of the total public school and public road budgets for the City and Boroughs of Southeast Alaska.

TABLE 3-201
FOREST RECEIPTS AND PAYMENTS TO THE STATE OF ALASKA, FY 1980-1988

Fiscal Year	Tongass Receipts 1/	Payments to Alaska
1980	26,024,494	6,506,124
1981	15,007,944	3,751,986
1982	21,622,764	5,405,691
1983	5,365,915	1,341,479
1984	4,063,189	1,015,797
1985	209,231	52,308
1986	1,967,240	491,810
1987 2/	-2,033,575	---
1988	1,232,672	308,168
1989	20,183,133	5,045,783
Total	93,643,006 3/	23,919,145

Source: ANILCA 706(a) Draft 1988 Supply and Demand Report Number 8

1/ Capital investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management costs, and are scheduled to achieve management objectives described in the Tongass Land Management Plan.

2/ Tongass receipts for fiscal year 1987 were negative as a result to Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

3/ Does not include receipts foregone as a result of the Federal Timber Contract Payment Modification Act. Estimated total value of affected contracts was approximately $54.5 million prior to the Act if all volume were harvested. Total value of the affected contracts as a result of the Act was approximately $1.2 million. The difference of $53.3 million represents receipts foregone, thus, the total Tongass receipts for the period fiscal years 1980-88 would have been $126.8 million.

NET CASH FLOW / PAYMENTS TO STATES

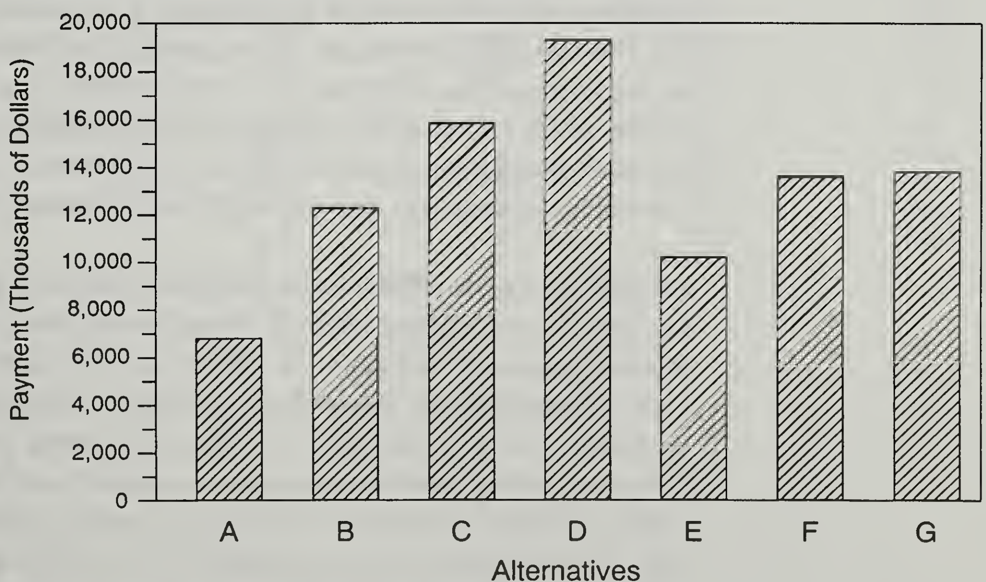
ENVIRONMENTAL CONSEQUENCES

Dollar payments to the State of Alaska are based on the 25 percent formula for uses of the Tongass land and resources that generate income for the Federal government. Ninety-nine percent of the payments to the State from Federal receipts are generated from timber sales. Money returned to the State is earmarked for use on public schools and roads. When money returns drop, the state must come up with other sources of revenues to maintain the same quality and quantity of school and road programs. This, in turn, may decrease the money available for other programs.

Figure 3-88 displays payments to the State of Alaska by alternative. Under anticipated mid-market conditions, Alternative A could generate about $6.8 million in payments to the state, while Alternative D would generate of about $19.3 million. These two Alternatives represent the range within which the other Alternatives fall. Average payment to the State between 1980 and 1989 was $2.6 million.

FIGURE 3-88

AVERAGE ANNUAL PAYMENTS TO THE STATE OVER THE NEXT TEN YEARS



Source: Forest Service FORPLAN Analysis, March - 1990

Table 3-202 displays cash flows to and from the U.S. Treasury for each alternative. The Table also displays the non-cash benefits for each alternative. Alternatives in this Table are ranked in order of descending Present Net Value.

The *total cost* column in the Table represents the total cost of managing the National Forest under each alternative. The total cost amount includes the cost of the recreation, wildlife, fisheries, transportation, and timber programs as well as the stewardship and protection costs of the Tongass.

Total revenue as shown in the Table displays the gross cash revenues the Federal Government will receive in each alternative. This includes revenues from timber sales, user fees, special use permits, land uses, power permits, and mineral leasing. The largest contributor to the total amount is the timber sale revenues. Revenues other than timber only account for approximately $200,000 per year in each alternative. The amount of variation in the total revenue is almost directly related to the amount of timber harvest. Those alternatives which have the highest timber allowable sale quantity (ASQ), also have the highest potential revenues. Alternatives C and D have the largest amount of revenues due to their ASQ's of 450 MMBF and 550 MMBF respectively. Alternative C could return $63,000,000 per year to Treasury in the first decade while Alternative D could return $77,000,000 per year over the same period. Alternative A with an ASQ of 181 MMBF has the lowest potential revenues, amounting to $27,100,000 per year.

Non-cash benefits are those benefits to society for which the Federal Government receives no actual financial return. Most of the goods and services produced fall into this category. Examples of this would be recreation use, sport fishing, hunting, commercial fish, and subsistence. The total benefits accrued to society in each alternative would then be the combination of total revenues and non-cash benefits. The non-cash benefits are much greater than the actual revenues received in all alternatives. This indicates most of the benefits to society are not charged for by the USDA Forest Service. The non-cash benefits do not fluctuate very much between alternatives since the amount of recreation, commercial fish, and other non-cash resources do not vary significantly between alternatives.

Net cash flow is the difference between total revenues and total cost. This amount represents the net cash flow of actual money the Federal Government could realize under each alternative. All alternatives are negative in the first two decades. This indicates that the Government will spend more money than it will receive in revenues in all alternatives in the initial years. Most alternatives have a positive cash flow in later periods. However, a negative cash flow does not equate to a below cost timber program. The total cost used in calculating the net cash flow in the Table includes the cost of recreation, fish, wildlife and stewardship as well as the cost associated with the timber program including roads. The timber cost represents only a portion of the total cost. Conversely, more that 99 percent of the

TABLE 3-202
AVERAGE ANNUAL CASH FLOWS AND NON-CASH BENEFITS
(MILLIONS OF UNDISCOUNTED 1985 DOLLARS PER YEAR)

Decade	Net Revenue MM $	Total Cost MM $	Total Revenue MM $	Non-Cash Benefits MM $
Altv. E 1	-18.1	58.9	40.8	148.4
2	-16.7	53.8	37.1	175.8
3	2.6	33.6	36.2	186.5
4	2.0	30.6	32.6	189.3
5	-0.6	31.4	30.8	192.3
Altv. C 1	-25.5	88.9	63.4	148.5
2	-27.0	82.0	55.0	175.8
3	10.1	43.8	53.9	186.6
4	9.3	41.5	50.8	189.4
5	6.2	43.0	49.2	192.0
Altv. G 1	-25.6	80.6	55.0	148.5
2	-24.4	74.9	50.5	175.8
3	8.8	41.8	50.6	186.6
4	7.2	39.3	46.5	189.4
5	3.5	40.6	44.1	192.2
Altv. F 1	-25.8	80.3	54.5	148.5
2	-24.6	75.1	50.5	175.8
3	8.5	42.2	50.7	186.5
4	6.8	39.5	46.3	189.4
5	3.4	40.6	44.0	192.3
Altv. A 1	-17.2	44.3	27.1	148.5
2	-17.9	38.9	21.0	175.8
3	-4.1	25.8	21.7	186.5
4	-4.2	25.2	21.0	189.4
5	-6.7	25.6	18.9	192.3
Altv. D 1	-28.9	105.9	77.0	148.5
2	-34.5	97.5	63.0	175.8
3	10.3	45.0	55.3	186.6
4	11.4	46.7	58.1	189.3
5	6.8	48.2	55.0	191.6
Altv. B 1	-33.9	83.2	49.3	148.7
2	-34.1	77.5	43.4	176.1
3	-2.0	38.2	36.2	186.7
4	1.3	40.0	41.3	189.6
5	-3.2	40.9	31.7	192.6

Source: Forest Service FORPLAN analysis

total revenue comes from the timber program. The timber revenues cover the timber costs in all alternatives except Alternative B.

The largest negative cash flows occur in the first two periods in all alternatives. This is due to large amounts of capital investments in the first ten decades for arterial/ collector roads, log transfer facilities, wildlife/fish enhancements, and recreation developments. Actual scheduling during implementation could result in less capital investments thus reducing total costs.

The largest negative net cash flow occurs in Alternative B. This is due to large capital investment costs required to harvest volumes from less economically desirable stands. Since this alternative maintains the long term sale contract harvest volume, but removes a significant amount of economically efficient lands, it results in a large negative cash flow. Alternative D also has large negative cash flow primarily due to the large capital investments required to obtain the high harvest level of 550 MMBF per year in the first decade.

The lowest negative cash flow occurs in alternatives A and E. These Alternatives come the closest to a positive return in the first decades due to their reduced cost of capital investments associated with timber harvesting. Although their total revenues are also much lower due to this harvest level, this is offset by the reduction in costs.

Table 3-203 displays the estimated fiscal impact of the Tongass timber program. The mid-market value of the timber which could be offered in each alternative was compared with the estimated costs (capital investments plus operating expenses) for five decades. The table displays for each administrative unit of the Tongass the anticipated average annual timber revenue, timber costs, net timber revenue, volume harvested, and acres harvested over the next 5 decades.

Forest-wide, the timber sale program produces revenues in excess of costs for all alternatives. In all alternatives except A and E, the timber sale program on the Chatham administrative unit has timber program costs in excess of receipts. This is due primarily to higher operating costs and lower values. The Stikine administrative area could produce timber program revenues in excess of costs in all alternatives except D. The Stikine timber program receipts do not cover the costs in that alternative due to the allowable sale quantity objective of 550 million board feet forest wide. The Ketchikan administrative unit has a timber program which can produce revenues in excess of anticipated costs in all alternatives.

TABLE 3-203

ESTIMATED FISCAL EFFECTS OF THE TONGASS TIMBER PROGRAM BY ALTERNATIVE

(5 Decade Average)

Admin			*Alternatives*						
Area	*Item*	*Units*	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Chatham	Costs	$1,000/Year	650	9,290	8,190	8,250	1,070	8,540	8,610
Chatham	Revenues	$1,000/Year	730	7,320	7,920	7,810	1,370	7,840	7,840
Chatham	Net Revenues	$1,000/Year	80	-1,970	-270	-440	300	-700	-770
Chatham	Harvest	MMBF/Year	5.6	62.4	63.1	63.9	10.6	62.8	62.9
Chatham	Harvest	MMCF/Year	1.0	16.0	16.0	16.0	2.0	16.0	16.0
Chatham	Harvest	Acres/Year	200	2,800	2,600	2,600	400	2,700	2,700
Ketchikan	Costs	$1,000/Year	9,310	23,190	22,400	25,170	15,560	18,560	20,480
Ketchikan	Revenues	$1,000/Year	13,190	24,510	30,000	32,460	22,030	27,680	27,830
Ketchikan	Net Revenues	$1,000/Year	3,880	1,320	7,600	7,290	6,470	9,120	7,350
Ketchikan	Harvest	MMBF/Year	92.9	190.0	212.3	230.5	155.0	196.3	197.2
Ketchikan	Harvest	MMCF/Year	22.0	45.0	50.03	54.0	37.0	47.0	47.0
Ketchikan	Harvest	Acres/Year	3,100	6,900	7,100	7,800	5,200	6,600	6,700
Stikine	Costs	$1,000/Year	5,760	7,140	12,860	23,510	8,790	10,040	10,000
Stikine	Revenues	$1,000/Year	7,810	9,770	16,280	21,180	11,890	13,480	13,470
Stikine	Net Revenues	$1,000/Year	2,050	2,630	3,420	-2,330	3,100	3,440	3,470
Stikine	Harvest	MMBF/Year	58.2	71.3	122.1	161.6	88.9	100.6	100.6
Stikine	Harvest	MMCF/Year	11.0	14.0	21.0	31.0	15.0	17.0	17.0
Stikine	Harvest	Acres/Year	1,900	2,400	4,000	5,600	2,900	3,200	3,300
Tongass	Costs	$1,000/Year	15,720	39,620	43,450	56,930	25,420	37,140	39,090
Tongass	Revenues	$1,000/Year	21,730	41,600	54,200	61,450	35,290	49,000	49,140
Tongass	Net Revenues	$1,000/Year	6,010	1,980	10,750	4,520	9,870	11,860	10,050
Tongass	Harvest	MMBF/Year	156.7	323.7	397.5	456.0	254.5	359.7	360.7
Tongass	Harvest	MMCF/Year	35.0	75.0	87.0	101.0	54.0	79.0	79.0
Tongass	Harvest	Acres/Year	5,200	12,100	13,700	16,000	8,500	12,500	12,700

Source: USDA Forest Service FORPLAN Analysis.

ECONOMIC EFFICIENCY

AFFECTED ENVIRONMENT

The National Forest Management Act of 1976 (NFMA) set forth explicit requirements for economic efficiency analysis of Forest management proposals. While economic efficiency must be analyzed and considered, it is not the sole decision criterion. Although the Forest Service has generally tried to achieve cost-efficient management (lowest possible input cost per unit of output), systematic evaluation of all costs and benefits from practices and activities has been undertaken only in recent years.

The measure of economic efficiency applied in formulating and evaluating alternatives is Net Public Benefits (36 CFR 219.1(a) and 219.12(f)). Net Public Benefits (NPB) are the sum of Present Net Value (PNV) and non-priced commodity values. PNV is the difference between the discounted value of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the planning area. Examples of non-priced benefits include scenic quality, wildlife habitat, and community stability. Values of some non-priced commodities are inferred from observations of indicators such as the number of participants, tolerance of congestion, and expense of participation.

The dominant non-priced commodities for the Tongass are embodied in the planning issues. One function of the public involvement process, which produced the planning issues, was the inference of non-priced commodity values.

To account for the ultimate subjectivity of the inferred demand for non-priced commodities, a range of production of priced and non-priced commodities is provided by the alternatives considered. Within each alternative, priced and non-priced commodities are produced in the most cost-efficient method by maximizing PNV. The major components of PNV on the Tongass are timber, recreation/tourism, and commercial fish.

ECONOMIC EFFICIENCY

ENVIRONMENTAL CONSEQUENCES

Table 3-204 is the primary display of economic efficiency by alternative. This table summarizes the changes in costs and benefits between alternatives. The Maximum Present Net Value Benchmark is used as the basis for comparison because it has the least number of management requirements, hence the highest present net value (PNV). The alternatives are ranked in order of descending PNV under the benchmark.

Present Net Value is shown in the second column of the Table. This figure represents the economic efficiency of each alternative. PNV is a yardstick used to measure the economic value resulting from management of the Forest. PNV is the difference between benefits and costs associated with the alternatives. The change in PNV from the Maximum PNV Benchmark is shown in the third column for each alternative. Each alternative has a specific management strategy or theme which requires certain land allocations or output levels that may not be the most economically efficient solution for the Forest. The difference in PNV between the most economically efficient solution and any other alternative is the opportunity cost of that alternative. The opportunity cost associated with the implementation of any alternative can be considered an economic cost of that alternative. The following discussion highlights the opportunity cost of each alternative and the primary reasons for the change.

Some general observations of these analyses can be made. The change in PNV is generally correlated with the timber harvest program. Those alternatives with the most economically efficient timber program also have the highest PNV; the alternatives that have the least efficient timber program have the lowest PNV.

Alternative E has a PNV of $4,449,000,000 and an associated opportunity cost of 140 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative:

> 23 areas identified in H.R. 987 were allocated to Wilderness, precluding timber harvest.
>
> All enacted municipal watersheds preclude timber harvest.
>
> All areas previously allocated to LUD II in the Tongass Land Management Plan (TLMP) were managed with no timber harvest.

TABLE 3-204 PRESENT NET VALUE COMPARISON OF ALTERNATIVES (MILLIONS OF 1985 DOLLARS)

							Discounted Benefits by Resource				Discounted Costs By Category			
Alternatives	Present Net Value	Change in Present Net Value [1]	Discounted Cost	Change in Discounted Cost [1]	Discounted Benefits	Change in Discounted Benefits	Comm. Fish	Rec/ Tourism	Timber	Other [2]	Roads	Timber	Rec/ Tourism	Other [3]
Maximum PNV Benchmark	4,589	0	1,201	0	5,790	0	2,152	1,766	1,353	519	734	363	51	53
E	4,449	-140	809	-392	5,258	-532	2,152	1,766	934	406	459	232	51	67
C	4,393	-196	1,330	129	5,723	-67	2,152	1,766	1,416	389	818	353	51	108
G	4,392	-197	1,202	1	5,594	-196	2,152	1,766	1,281	395	739	314	51	98
F	4,386	-203	1,199	-2	5,585	-205	2,152	1,766	1,278	389	730	318	51	100
A	4,383	-206	542	-659	4,925	-865	2,152	1,766	596	411	287	139	51	65
D	4,317	-272	1,598	397	5,915	125	2,152	1,766	1,610	387	1,030	418	51	99
B	4,182	-407	1,222	21	5,404	-386	2,152	1,766	1,081	405	794	288	51	89

Source: USDA Forest Service FORPLAN Analysis.

[1]/ All changes are measured incrementally from the Maximum PNV Benchmark.

[2]/ Other discounted benefits include (hunting, sport fishing, and subsistence)

[3]/ Other discounted costs include protection/stewardship costs, fish improvement projects, log transfer facilities, recreation improvement projects.

All areas previously allocated to a LUD III special in the Current Plan (TLMP) were managed precluding timber harvest.

Beach fringe or estuary areas previously allocated to LUD III in the TLMP were managed with no timber harvest.

All areas previously allocated to LUD III in the TLMP were constrained to limit the amount of timber harvest and meet the inventoried visual objectives.

Areas mapped for retention under the TLMP implementation were managed with no timber harvest.

All lands in the isolated operability class were precluded from timber harvesting.

Strata C and D (stands generally greater than 30,000 board feet per acre) were not allowed to contribute more the 50% of the total allowable sale quantity in the first decade in order maintain more high volume old growth for a longer period of time.

Alternative C has a PNV of $4,393,000,000 and an associated opportunity cost of 196 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

All enacted municipal watersheds were precluded from timber harvest.

All areas previously allocated to LUD II in the Tongass Land Management Plan (TLMP) were precluded from timber harvest.

All areas previously allocated to a LUD III special in the TLMP were precluded from timber harvest.

Beach fringe or estuary areas previously allocated to LUD III in the TLMP were precluded from timber harvest.

Areas previously allocated to LUD III in the TLMP were constrained to limit the amount of timber harvest and meet the inventoried visual objectives.

Areas mapped for retention during TLMP implementation were precluded from timber harvest.

The allowable sale quantity was specified to be 450 MMBF per year in the first decade.

Timber supply for the two long term timber sale contracts was maintained.

Timber volume was scheduled from specific geographic zones on the Chatham Area to meet identified needs in the APC long term contract.

All lands in the isolated operability class were precluded from timber harvest.

Strata C and D were not allowed to contribute more the 50% of the total allowable sale quantity in the first decade in order maintain more high volume old growth for a longer period of time..

Alternative G has a PNV of $4,392,000,000 and an associated opportunity cost of 197 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

Portions of 16 areas identified by the Southeast Conference (February, 1990) as "protected areas" were precluded from timber harvest.

All enacted municipal watersheds were precluded from timber harvest.

All areas previously allocated to LUD II in the Tongass Land Management Plan (TLMP) were precluded from timber harvest.

All areas previously allocated to a LUD III special in the TLMP were precluded from timber harvest.

Beach fringe or estuary areas previously allocated to LUD III in the TLMP were precluded from timber harvest.

Areas previously allocated to LUD III in the TLMP were constrained to limit the amount of timber harvest and meet the inventoried visual objectives.

Areas mapped for retention during TLMP implementation were precluded from timber harvest.

Timber supply for the two long term timber sale contracts was maintained.

Timber volume was scheduled from specific geographic zones on the Chatham Area to meet identified needs in the APC long term contract.

All lands in the isolated operability class were precluded from timber harvest.

Strata C and D were not allowed to contribute more the 50% of the total allowable sale quantity in the first decade in order maintain more high volume old growth for a longer period of time..

Alternative F has a PNV of $4,386,000,000 and an associated opportunity cost of 203 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

12 areas identified as "protected areas" in the original Southeast Conference proposal (March, 1989) were precluded from timber harvest.

All enacted municipal watersheds were precluded from timber harvest.

All areas previously allocated to LUD II in the Tongass Land Management Plan (TLMP) were precluded from timber harvest.

All areas previously allocated to a LUD III special in the TLMP were precluded from timber harvest.

Beach fringe or estuary areas previously allocated to LUD III in the TLMP were precluded from timber harvest.

Areas previously allocated to LUD III in the TLMP were constrained to limit the amount of timber harvest and meet the inventoried visual objectives.

Areas mapped for retention during TLMP implementation were precluded from timber harvest.

Timber supply to the two long term timber sale contracts was maintained.

Timber volume was scheduled from specific geographic zones on the Chatham Area to meet identified needs in the APC long term contract.

All lands in the isolated operability class were precluded from timber harvest.

Strata C and D were not allowed to contribute more the 50% of the total ASQ in the first decade in order maintain more high volume old growth for a longer period of time..

Alternative A has a PNV of $4,383,000,000 and an associated opportunity cost of 206 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

23 areas identified in H.R. 987 as wilderness were precluded from timber harvest.

All priority 1 potential Research Natural Areas (RNA's) were precluded from timber harvest.

All enacted municipal watersheds were precluded from timber harvest.

All value comparison units (VCUs) which have a Forest Habitat Integrity Program (FHIP) rating of 1 and are still currently roadless were precluded from timber harvest.

All beach fringe and estuary areas were precluded from timber harvest.

All identified recreation places with a ROS rating of primitive or semi-primitive were precluded from timber harvest.

Areas previously allocated as LUD III special in the Tongass Land Management Plan (TLMP) were precluded from timber harvest.

Areas previously allocated as LUD I release or LUD II in the TLMP were precluded from timber harvest.

All areas identified as recreation places with a ROS of Roaded Natural, Rural, or Urban were limited in the amount of timber harvesting to meet the inventoried visual quality objectives.

Areas identified as sensitivity level 1 viewsheds were managed to limit the amount of timber harvesting and meet the visual quality objectives.

Areas with an inventoried visual quality objective of maximum modification were managed to limit the amount of timber harvesting and meet the visual quality objective.

Alternative D has a PNV of $4,317,000,000 and an associated opportunity cost of 272 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

Enacted municipal watersheds were precluded from timber harvest.

Estuary areas were precluded from timber harvest.

Identified recreation places within 15 miles of a community which currently have a ROS class of either primitive or semi-primitive were precluded from timber harvest.

Identified recreation places within 15 miles of a community which currently have a ROS class of either rural, roaded natural, or urban were managed to limit the amount of timber harvest and meet the visual objectives.

Areas with low economic value for timber harvesting were precluded from timber harvest.

The allowable sale quantity was specified at 550 MMBF per year in the first decade.

Timber supply to the two long term timber sales was maintained.

Timber volume was scheduled from specific geographic zones on the Chatham Area to meet identified needs in the APC long term contract.

Alternative B has a PNV of $4,182,000,000 and an associated opportunity cost of 407 million dollars. This opportunity cost results from imposing the following management objectives necessary to meet the theme of this alternative.

The original Southeast Conference proposal (March, 1989) for 12 "protected areas" were precluded from timber harvest.

All priority 1 potential RNAs were precluded from timber harvest.

All enacted municipal watersheds were precluded from timber harvest.

All value comparison units (VCUs) which have a Forest Habitat Integrity Program (FHIP) rating of 1 and are still currently roadless were precluded from timber harvest.

All beach fringe and estuary areas were precluded from timber harvest.

All identified recreation places with a ROS rating of primitive or semi-primitive were precluded from timber harvest.

Areas previously allocated as a LUD III special in the Tongass Land Management Plan (TLMP) were precluded from timber harvest.

Areas previously allocated to a LUD I release or LUD II in the Tongass Land Management Plan were precluded from timber harvest.

All areas identified as recreation places with a ROS of Roaded Natural, Rural, or Urban were managed to limit the amount of timber harvesting and meet the visual quality objectives.

Areas identified as sensitivity level 1 viewsheds were managed to limit the amount of timber harvesting and meet the visual quality objectives.

Areas previously allocated to LUD III in the TLMP which also had an inventoried visual quality objective other than maximum modification were managed to limit the amount of timber harvesting and meet the visual quality objectives.

Timber supply to the two long term timber sale contracts was maintained.

Timber volume was scheduled from specific geographic zones on the Chatham Area to meet identified needs in the APC long term contract.

The distribution of benefits and costs are shown in the last eight columns of Table 3-204. The purpose of these columns is to display the economic efficiency of the different programs on the Tongass. It also demonstrates the composition of the total discounted benefit column and the total discounted cost column.

Recreation and tourism comprises between 30% and 36% of the total discounted benefits. Although this is a significant amount of the total benefits, it does not vary between alternatives due to similar recreation use figures in all alternatives. The PNV of the recreation program is approximately 1.7 billion dollars with a benefit cost ratio of 35 to 1.

Timber shows the highest variation in both discounted benefits and discounted costs between the alternatives. Almost all the variation between the alternatives is generated by changes in the timber program. The amount of timber benefits is directly related to the harvest level in each alternative as are the timber and road costs. The timber contributes between 12% and 27% to the total benefits. The PNV of the timber program (including roads) is positive in all alternatives except B where it is close to zero. The PNV of the timber program including roads, ranges approximately between negative .1 billion dollars in Alternative B, to a positive .3 billion dollars in Alternative C. The timber program has a benefit cost ratio which ranges from .90 in Alternative B and 1.40 in Alternative A.

Commercial Fish is the largest contributor to total discounted benefits. It comprises between 36% and 44% of the total benefits. Although this is a significant contribution to total benefits, it does not vary between alternatives due to the minor effect on fish production in all alternatives. The PNV of the fish program is approximately 2.1 billion dollars with a benefit cost ratio of 65 to 1.

RESOURCE DEMAND ANALYSIS

AFFECTED ENVIRONMENT AND

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section will describe the anticipated demand for the various goods and services produced by the Tongass and how each alternative responds to meeting those demands. Demand will be discussed for the following resources, recreation/ tourism, hunting, fishing, timber, and commercial fish.

TIMBER

Tongass National Forest Timber is traded in the Pacific Rim Market. Over 90 percent of the wood pulp produced in Alaska is exported. The solid wood products (logs, cants and lumber) are shipped to Japan, Korea, The Peoples Republic of China, Taiwan and Canada. The dissolving pulp produced from the hemlock and lower grade spruce logs is shipped to a wider array of countries. For example, in 1988, pulp products were shipped from Alaska to Argentina, Austria, Bangladesh, Belgium, Bulgaria, China, Egypt, France, West Germany, India, Indonesia, Iraq, Japan and six other foreign countries. Approximately 15 percent of the dissolving pulp produced in Alaska is shipped to destinations in the continental United States. The Pacific Rim demand for wood products far exceeds the productive capability of the Tongass National Forest. The Tongass is a very small player in a very large market. It is anticipated that the Pacific Rim market will be able to purchase all the wood products which can be supplied at a cost lower than export value.

HUNTING

The historic demand for hunting on the Tongass is displayed in Table 3-205. Hunting for most animals has been increasing on the Tongass during the 1980s. Deer hunting has increased 57% from 31,400 hunter days in 1980 to 49,400 hunter days in 1988. The peak demand was in 1986 when the Tongass experienced 67,200 deer hunter days. Black bear hunting has increased from 800 hunter days in 1980 to 1,700 hunter days in 1987. This represents an increase of more than 112% in seven years. Brown bear hunting has also increased but not at the same rate as black bear hunting. The number of brown bear hunter days rose from 500 in 1980 to 700 in 1987 (40%)

Due to the limited population of moose and mountain goats, the amount of hunting has been strictly limited by the State Game Board. Therefore the number of hunter days shown in Table 3-205 may not be reflective of the total demand for hunting these animals.

TABLE 3-205
HISTORIC HUNTING USE **(Thousands of hunter days per year)**

Year	Deer Hunting	Black Bear Hunting	Brown Bear Hunting	Moose Hunting	Mtn. Goat Hunting	Water Fowl Hunting
1980	31.4	.8	.5	NA	1.4	NA
1981	NA	.8	.4	NA	1.8	NA
1982	45.7	1.0	.4	NA	1.8	NA
1983	52.6	.9	.6	NA	1.7	14.4
1984	54.5	1.1	.6	5.8	1.5	13.5
1985	50.3	1.4	.5	4.4	1.5	10.1
1986	67.2	1.6	.6	4.0	1.4	10.1
1987	67.0	1.7	.7	4.2	1.3	NA
1988	49.4	NA	NA	4.2	NA	NA

Source: Alaska Department of Fish and Game records.

Future demand for hunting was estimated for deer, black bear, and brown bear hunting only. Since the demand for moose, mountain goats, and water fowl hunting has been limited by the State Game Board due to small populations, and/or limited habitat and is not expected to change significantly in the future. No demand projections were made for these types of hunting. In addition, it is not anticipated that any management activities considered in any of the alternatives is expected to significantly alter the amount of habitat or populations of these species.

The demand projections are shown in Table 3-206. Demand was considered to be a function of population in the market area for these projections. A demand model was developed which related past hunting use to past human population. Population projections for the market area were obtained from the *Bureau of Economic Analysis 1985* were input into the demand model to predict future demand. The results are displayed bracketed with a 95% confidence interval.

TABLE 3-206
PROJECTED HUNTING DEMAND
Thousands of hunter days per year

	Deer Hunting	
Year	*Projected Demand*	*95% Confidence Interval*
1995	83.3	47.9 to 118.7
2005	104.1	52.6 to 155.6
2015	120.0	55.2 to 184.4
2025	128.5	56.5 to 200.5
2035	136.7	57.5 to 216.2
	Black Bear Hunting	
Year	*Projected Demand*	*95% Confidence Interval*
1995	2.6	2.0 to 3.2
2005	3.5	2.6 to 4.4
2015	4.1	3.0 to 5.3
2025	4.5	3.2 to 5.7
2035	4.8	3.5 to 6.2
	Brown Bear Hunting	
Year	*Projected Demand*	*95% Confidence Interval*
1995	.9	.5 to 1.2
2005	1.1	.5 to 1.6
2015	1.2	.6 to 1.9
2025	1.3	.6 to 2.0
2035	1.4	.6 to 2.2

Source: USDA Forest Service Demand Projections, 1990.

Tables 3-207, 3-208 and 3-209 display how each alternative meets the anticipated demand for hunting. The three Tables display the projected demand, capacity and what percent of the capacity is neededfor each species hunted by alternative.

Deer hunting demand is met in every alternative for the next three decades. In the first decade the demand for deer hunting will range between 60 and 63 percent of the potential capacity. No alternative however, is able to meet the steadily increasing projected demand for deer hunting over the next 5 decades. This will result in either a reduction in the success rate of hunters, imposition of reduced bag limits, or shorter seasons. The point at which demand exceeds capacity will occur sooner in alternatives B, C, D, E, F and G. These alternatives will face this situation after approximately 4 decades. Alternative A will have an additional 10 years before demand exceeds capacity.

TABLE 3-207
RELATIONSHIP OF ANTICIPATED DEMAND TO FUTURE CAPACITY FOR DEER HUNTING BY ALTERNATIVE

YEAR	PROJECTED DEMAND	ALTERNATIVE A CAPACITY	%USED	ALTERNATIVE B CAPACITY	%USED	ALTERNATIVE C CAPACITY	%USED	ALTERNATIVE D CAPACITY	%USED	ALTERNATIVE E CAPACITY	%USED	ALTERNATIVE F CAPACITY	%USED	ALTERNATIVE G CAPACITY	%USED
1954		153.6		153.6		153.6		153.6		153.6		153.6		153.6	
1988		141.1		141.1		141.1		141.1		141.1		141.1		141.1	
1995	83.3	138.2	60%	135.2	62%	133.6	62%	131.8	63%	136.5	61%	135.4	62%	135.2	62%
2005	104.1	136.3	76%	131.3	79%	128.7	81%	126.5	82%	133.5	78%	130.3	80%	130.2	80%
2015	120.0	134.4	89%	127.5	94%	123.7	97%	121.2	99%	130.4	92%	125.3	96%	125.2	96%
2025	128.5	132.5	97%	123.6	100%	118.8	100%	115.8	100%	127.4	100%	120.2	100%	120.1	100%
2035	136.9	130.6	100%	119.7	100%	113.8	100%	110.5	100%	124.3	100%	115.1	100%	115.1	100%

TABLE 3-208
RELATIONSHIP OF ANTICIPATED DEMAND TO FUTURE CAPACITY FOR BLACK BEAR HUNTING BY ALTERNATIVE

YEAR	PROJECTED DEMAND	ALTERNATIVE A CAPACITY	%USED	ALTERNATIVE B CAPACITY	%USED	ALTERNATIVE C CAPACITY	%USED	ALTERNATIVE D CAPACITY	%USED	ALTERNATIVE E CAPACITY	%USED	ALTERNATIVE F CAPACITY	%USED	ALTERNATIVE G CAPACITY	%USED
1954		3.3		3.3		3.3		3.3		3.3		3.3		3.3	
1988		3.3		3.3		3.3		3.3		3.3		3.3		3.3	
1995	2.6	3.3	78%	3.3	78%	3.3	78%	3.3	78%	3.3	78%	3.3	78%	3.3	78%
2005	3.5	3.3	100%	3.3	100%	3.2	100%	3.2	100%	3.3	100%	3.2	100%	3.2	100%
2015	4.1	3.3	100%	3.2	100%	3.2	100%	3.1	100%	3.2	100%	3.2	100%	3.2	100%
2025	4.5	3.2	100%	3.2	100%	3.1	100%	3.0	100%	3.2	100%	3.1	100%	3.1	100%
2035	4.8	3.2	100%	3.1	100%	3.0	100%	2.9	100%	3.1	100%	3.0	100%	3.0	100%

TABLE 3-209
RELATIONSHIP OF ANTICIPATED DEMAND TO FUTURE CAPACITY FOR BROWN BEAR HUNTING BY ALTERNATIVE

YEAR	PROJECTED DEMAND	ALTERNATIVE A CAPACITY	%USED	ALTERNATIVE B CAPACITY	%USED	ALTERNATIVE C CAPACITY	%USED	ALTERNATIVE D CAPACITY	%USED	ALTERNATIVE E CAPACITY	%USED	ALTERNATIVE F CAPACITY	%USED	ALTERNATIVE G CAPACITY	%USED
1954		2.4		2.4		2.4		2.4		2.4		2.4		2.4	
1988		2.4		2.4		2.4		2.4		2.4		2.4		2.4	
1995	.9	2.4	38%	2.4	38%	2.4	38%	2.4	38%	2.4	38%	2.4	38%	2.4	38%
2005	1.1	2.4	46%	2.4	46%	2.4	46%	2.4	46%	2.4	46%	2.4	46%	2.4	46%
2015	1.2	2.4	50%	2.4	50%	2.4	50%	2.4	50%	2.4	50%	2.4	50%	2.4	50%
2025	1.3	2.4	54%	2.3	56%	2.3	56%	2.3	56%	2.4	54%	2.3	56%	2.3	56%
2035	1.4	2.4	58%	2.3	61%	2.3	61%	2.3	61%	2.4	58%	2.3	61%	2.3	61%

Source: USDA Forest Service FORPLAN Analysis.

Black bear hunting demand is met the first decade in all alternatives. In the first decade the demand for black bear hunting will be 78 percent of the potential capacity. No, alternative however, is able to meet the steadily increasing projected demand for black bear hunting over the next 5 decades. This will result in either a reduction in the success rate of hunters, imposition of reduced bag limits, or shorter seasons. The point at which demand exceeds capacity will occur in the second decade for all Alternatives. Even 1954 habitat conditions would not keep pace with the prediction of rapidly increasing demand for black bear hunting beyond the first decade.

Brown bear hunting demand is met in every alternative over the next five decades. In the first decade the demand for brown bear hunting will only be 38 percent of the potential capacity. Demand never rises above 61 percent of the potential brown bear hunting capacity in any alternative over the next five decades. This should prevent any reduction in the success rate of hunters, imposition of reduced bag limits, or shorter seasons.

SPORT FISHING

Sport fishing has increased more than 41% from 1977 to 1987 on the Tongass. The largest component of sport fishing demand has been salmon fishing. Future demand was estimated for total sport fishing on the Tongass and is displayed with the historic use levels in Table 3-210. The demand projections were considered to be a function of population in the market area. A demand model was developed which related past sport fishing use to past population. Population projections for the market area from the *Bureau of Economic Analysis 1985* were input into the demand model to predict future demand. The results are displayed bracketed with a 95% confidence interval.

TABLE 3-210
HISTORIC AND PROJECTED SPORT FISHING DEMAND
(Thousands of Fish User Days per Year)

Year	*Historic Use/ Projected Demand*	*95% Confidence Interval*
1977	115.5	
1978	103.3	
1979	106.7	
1980	117.8	
1981	115.7	
1982	135.2	
1983	143.4	
1984	145.0	
1985	152.7	
1986	155.1	
1987	163.2	
1995	202.1	178.5 to 225.7
2005	239.3	208.4 to 270.1
2015	267.8	230.8 to 304.7
2025	282.9	242.6 to 323.3
2035	298.1	254.4 to 341.8

Source: Alaska Department of Fish Game, Michael J. Mills, November 1987; USDA Forest Service Demand Analysis , 1990.

Table 3-211 displays how each alternative meets the anticipated demand for sport fishing. It displays the projected demand, capacity and what percent of the capacity is used in each alternative. Every alternative produces significantly more sport fishing capacity than anticipated demand in all time periods. In the first decade projected demand is only 22 percent of the potential capacity. After 50 years demand is still projected to be only 32 percent of the potential capacity.

TABLE 3-211
RELATIONSHIP OF ANTICIPATED DEMAND TO FUTURE CAPACITY FOR SPORT FISHING BY ALTERNATIVE

YEAR	PROJECTED DEMAND	ALTERNATIVE A CAPACITY	%USED	ALTERNATIVE B CAPACITY	%USED	ALTERNATIVE C CAPACITY	%USED	ALTERNATIVE D CAPACITY	%USED	ALTERNATIVE E CAPACITY	%USED	ALTERNATIVE F CAPACITY	%USED	ALTERNATIVE G CAPACITY	%USED
1995	202.1	905.6	22%	905.6	22%	905.6	22%	905.6	22%	905.6	22%	905.6	22%	905.6	22%
2005	239.3	998.5	24%	998.5	24%	998.5	24%	998.5	24%	998.5	24%	998.5	24%	998.5	24%
2015	267.8	998.5	27%	998.5	27%	998.5	27%	998.5	27%	998.5	27%	998.5	27%	998.5	27%
2025	282.9	967.5	29%	967.5	29%	967.5	29%	967.5	29%	967.5	29%	967.5	29%	967.5	29%
2035	298.1	944.2	32%	944.2	32%	944.2	32%	944.2	32%	944.2	32%	944.2	32%	944.2	32%

Source: USDA Forest Service FORPLAN Analysis.

COMMERCIAL FISHING

Alaskan commercial fish are traded in the Pacific Rim Market. Most of the commercial fish harvested in Alaska is exported. The fish are shipped to Japan, Korea, The Peoples Republic of China, Taiwan, Canada, other foreign countries and the continental United States. The Pacific Rim demand for fish far exceeds the productive capability of the Tongass National Forest. The Tongass is a very small player in a very large market. It is anticipated that the Pacific Rim market will be able to purchase all the commercial fish harvested from Southeast Alaska.

RECREATION

Recreation use has been steadily increasing on the Tongass over the last ten years. The largest increases in recreation use have been in the viewing scenery activity. This activity increased more than 290% from 1977 to 1987. The largest components of total recreation demand have been water based motor travel (44%) and viewing scenery (29%). The other activities on the forest account for the remaining 27% of the historic recreation use. Despite this steady increase in use, it should be noted however, that there have been some large fluctuations in historic recreation use. These fluctuations have likely occurred due to a variety of reasons including weather, gasoline shortages, ferry strikes, fear of international terrorism, and others.

TABLE 3-212
HISTORIC RECREATION USE BY MAJOR ACTIVITY
(THOUSANDS OF RECREATION VISITOR DAYS PER YEAR)

Year	*Viewing Scenery*	*Land Based Motor Travel*	*Water Based Motor Travel*	*Hiking*	*Camping*	*Cabin Use*	*Other*	*Total*
1977	229.7	95.3	381.9	89.2	296.7	9.2	35.4	1,169.2
1978	594.3	99.0	1,319.9	106.5	214.5	5.4	43.1	2,009.0
1979	479.1	109.6	565.4	107.8	208.5	8.4	61.2	1,592.9
1980	250.9	58.8	665.2	102.1	153.9	56.0	59.1	1,390.7
1981	331.8	92.0	594.1	130.9	177.5	85.0	54.8	1,523.5
1982	365.9	98.2	559.3	124.2	172.0	95.6	88.3	1,564.2
1983	578.9	78.3	1,383.2	102.5	171.6	92.5	40.5	2,484.4
1984	314.4	56.1	897.2	94.5	147.0	72.3	25.0	1,643.2
1985	1,269.5	62.6	1,300.7	87.9	107.6	77.3	22.4	2,971.2
1986	451.6	87.0	759.7	88.8	118.9	77.5	24.6	1,653.6
1987	899.9	99.3	857.2	89.5	129.6	75.4	25.0	2,221.3

Source: USDA Forest Service Recreation Information Management (RIM) data Alaska Region, 1977-1988.

Future demand was estimated for total recreation use only. Since most recreation experiences on the Forest span several of the activities mentioned (someone goes "camping", "hikes" along a trail, sits somewhere "viewing the scenery" and returns home via "water based motor travel") it was considered more appropriate to project demand for a composite recreation experience rather than individual activities.

The demand projection as discussed above is shown in Table 3-213. Demand projections were considered to be a function of population in the market area. A demand model was developed which related past recreation use to past population. Population projections for the market area from the *Bureau of Economic Analysis 1985* were input into the demand model to predict future demand. The results are displayed bracketed with a 95% confidence interval.

TABLE 3-213
HISTORIC AND PROJECTED RECREATION DEMAND
(Thousands of Recreation Visitor Days Per Year)

Year	*Projected Demand*	*95% Confidence Interval*
1995	2830.7	1208.4 to 4453.1
2005	3358.1	1238.8 to 5477.4
2015	3762.2	1223.6 to 6300.9
2025	3977.5	1207.6 to 6747.3
2035	4192.7	1187.7 to 7197.6

Source: USDA Forest Service Demand Analysis 1990.

Table 3-214 displays how each alternative meets the anticipated demand for recreation. It displays for total recreation use the projected demand, capacity, and what percent of the capacity is needed in each alternative. Every alternative produces enough recreation capacity over the next 50 years to meet projected demand. The reductions in recreation capacity are the result of timber harvest in inventoried recreation places. The largest reductions occur in alternatives C and D, however these alternatives still maintain sufficient capacity to meet demand.

TABLE 3-214
RELATIONSHIP OF ANTICIPATED DEMAND TO FUTURE CAPACITY FOR RECREATION AND TOURISM BY ALTERNATIVE

		ALTERNATIVE A		*ALTERNATIVE B*		*ALTERNATIVE C*		*ALTERNATIVE D*		*ALTERNATIVE E*		*ALTERNATIVE F*		*ALTERNATIVE G*	
YEAR	*PROJECTED DEMAND*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*	*CAPACITY*	*%USED*
1995	2830.7	4,271	66%	4,249	67%	4,240	67%	4,219	67%	4,281	66%	4,231	67%	4,237	67%
2005	3358.1	4,255	79%	4,224	80%	4,080	82%	4,108	82%	4,200	80%	4,157	81%	4,156	81%
2015	3762.2	4,244	89%	4,151	91%	4,039	93%	4,016	94%	4,146	91%	4,071	92%	4,061	93%
2025	3977.5	4,259	93%	4,159	96%	4,108	97%	4,095	97%	4,168	95%	4,136	96%	4,127	96%
2035	4192.7	4,238	99%	4,193	100%	4,191	100%	4,193	100%	4,195	100%	4,192	100%	4,187	100%

Source: USDA Forest Service FORPLAN Analysis.

POPULATION

AFFECTED ENVIRONMENT

CHARACTERISTICS

The majority of communities in Southeast Alaska are small, isolated from each other, and accessed only by air or water. Only four communities in Southeast are accessible by land: Skagway, Haines and Klukwan in the north, and Hyder in the south. Juneau, Alaska's capital, with a population of about 23,700, is the largest community in Southeast Alaska. It is the only community over 20,000 and represents 40 percent of the entire population of Southeast. The two mid-sized communities in Southeast are Sitka with about 8,200 people, and Ketchikan with about 12,700 people. Together Juneau, Sitka, and Ketchikan comprise 73 percent of Southeast's population and are its only full service communities. The remainder of the population is scattered in small towns and villages throughout the Southeast. Table 3-215 shows that many of these communities have populations of less than 2,000.

TABLE 3-215
POPULATION OF SOUTHEAST ALASKA COMMUNITIES

Community	*Population*	*Community*	*Population*
Angoon	528	Klukwan	133
Coffman Cove	224	Metlakatla	1,554
Craig	1,182	Meyers Chuck	30
Edna Bay	69	North Whale Pass	50
Elfin Cove	60	Pelican	243
Gustavus	158	Petersburg	4,149
Haines	1,638	Point Baker	35
Hollis	82	Port Protection	58
Hoonah	736	Port Alexander	108
Hydaburg	379	Saxman	266
Hyder	78	Sitka	8,196
Juneau	23,729	Skagway	585
Kake	645	Tenakee Springs	95
Kasaan	40	Thorne Bay	477
Ketchikan	12,705	Wrangell	2,913
Klawock	795	Yakutat	593

Sources: "*Demographic Background Material for 30 Southeast Alaska Communities*" by Robert F. Schroeder, Ph.D. Report to the Alaska Board of Fisheries Meeting Juneau, Alaska, February and March, 1989. Division of Subsistence Alaska Department of Fish and Game. February 1989; and, "*Southeast Alaska Rural Community Resource Use Profiles*", Alaska Department of Fish & Game Division of Subsistence Technical Paper Series. A Report to the Board of Fisheries, February 1989.

Native populations in Alaska are primarily Tlingit, Aleut, Eskimo, Haida, and Athabascan. While Native populations nationwide are one percent of the total population, they comprise 13 percent of Southeast Alaska's population. Some Southeast Alaska communities have a greater proportion of Alaska Natives in their populations. Prince of Wales Island, outer Ketchikan, Skagway, Yakutat, and Angoon have populations that are over 40 percent Native. The strength of Native communities lies in their common tie to subsistence.

TRENDS

Between 1960 and 1985, Alaska's population grew from 230,400 to 539,600, an increase of 234 percent. Population levels are shown in Figures 3-89 and 3-90. The greatest amount of population growth occurred during the "boom" period associated with the oil industry, however, population increases took place over the entire period. Projections from state agencies indicate that population increases are likely to continue (Alaska Department of Labor 1982). An increase of another 79,700 people or 15 percent is anticipated by 1995 (Alaska Department of Labor 1987). A 61 percent population increase is expected over the next 50 years (U.S. Department of Commerce 1985). Between 1960 and 1985, Southeast Alaska's population also grew, but at a much slower rate, increasing 134 percent. In 1960, Southeast residents made up 16 percent of the state's total population. By 1985, the population of Southeast was only 12 percent of Alaska's total population.

FIGURE 3-89

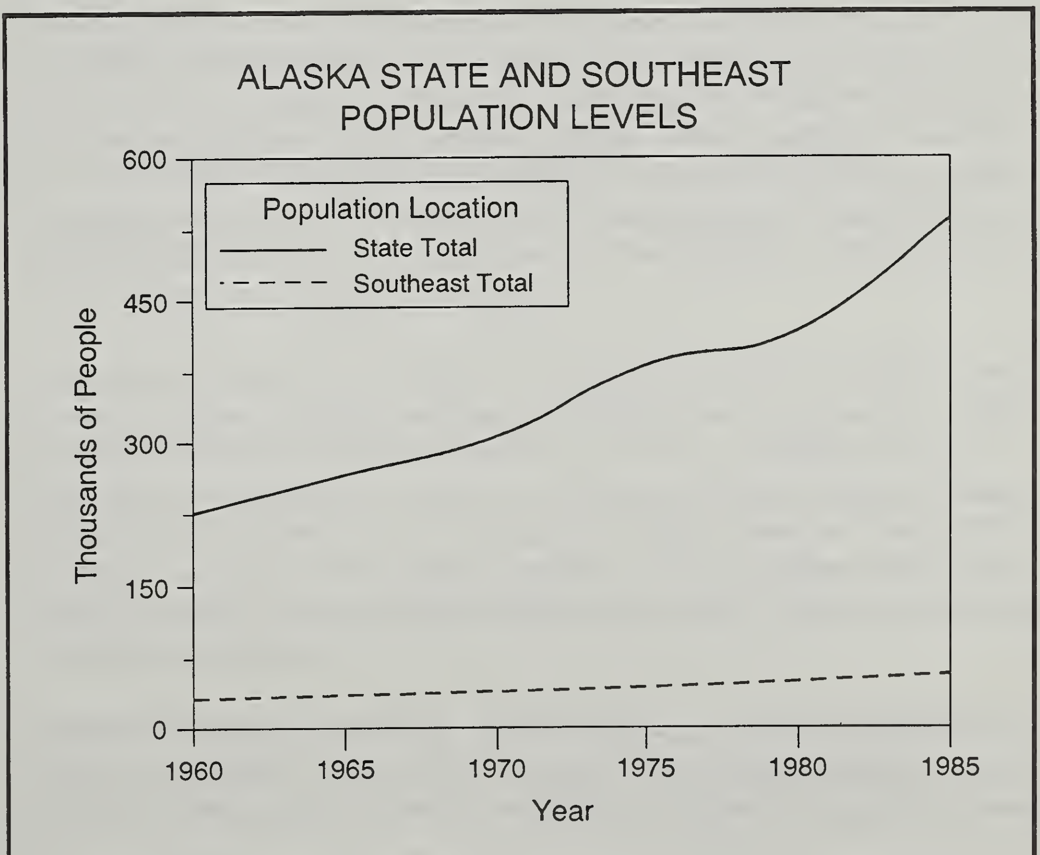
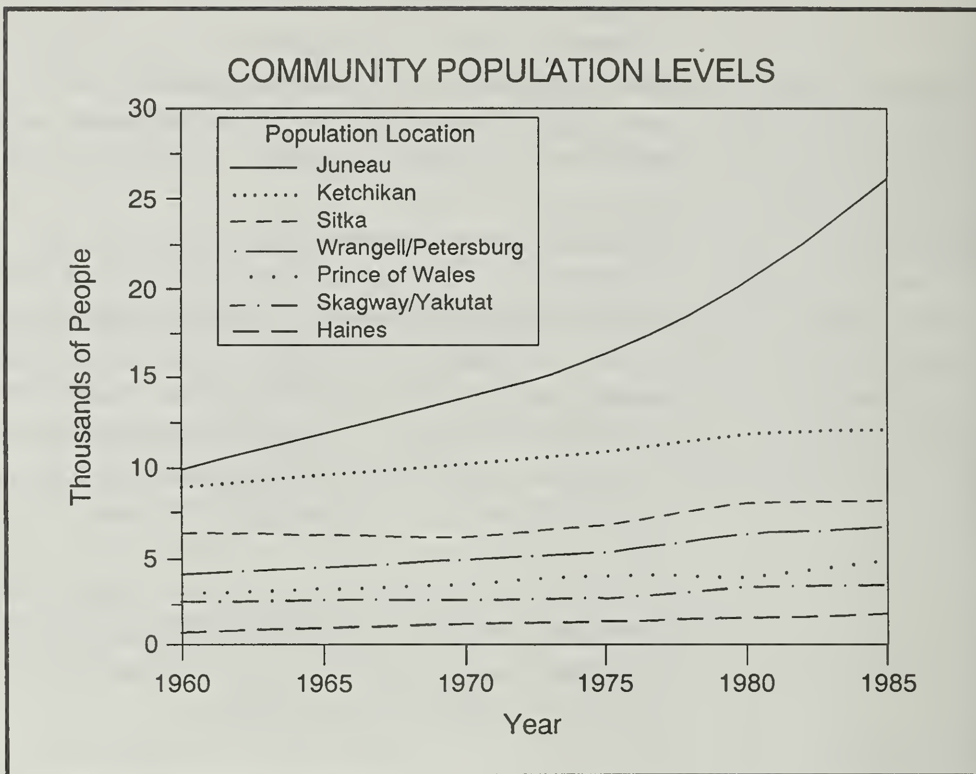


FIGURE 3-90


COMMUNITY POPULATION LEVELS
Population Location
Juneau
Ketchikan
Sitka
Wrangell/Petersburg
Prince of Wales
Skagway/Yakutat
Haines
Thousands of People
0
5
10
15
20
25
30
1960
1965
1970
1975
1980
1985
Year

POPULATION

ENVIRONMENTAL CONSEQUENCES

EFFECTS

Net population change in the region is most directly influenced by economic opportunities. Such variables as currency exchange rates; foreign demand for natural resources; interest rates; and the availability of alternative, cost-competitive sources of supply often have much greater influence over the economy of Southeast Alaska than National Forest Resource programs. It is anticipated, however, that employment associated with goods and services provided by the Tongass National Forest will induce employment-related population changes. Relative to some other regions of the State, southeast Alaska's population has grown slowly and has remained fairly stable. Those population fluctuations that have occurred are frequently associated with boom-and-bust cycles of the economy.

Forest management alternatives that provide greater flexibility for resource development will invariably attract in-migration to varying degrees as a result of associated employment opportunities. To the degree that employment is expected to become relatively permanent, population change related to resource-extraction (mining, logging, resource-related government administration, etc.--an exception being cannery workers) may induce a more stable, permanent population.

Many communities have a history of moderate boom-and-bust population cycles associated with expansion and contraction of the local economy. They have had experience adapting to these cycles, and they have often institutionalized into their social structures the capacity to adapt to these swings in population. It is not anticipated that population changes induced by any increased forest management activities will be pronounced enough to seriously strain the capacity of local institutions (e.g., local government, school systems, medical services, etc.) to adapt to the resulting in-migration.

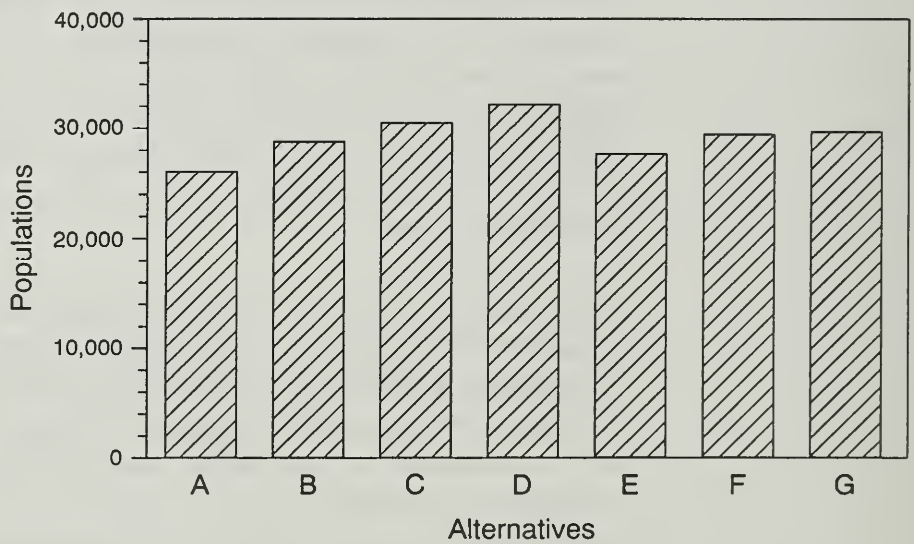
Alternatives emphasizing recreation and tourism, on the other hand, are projected to result in slower (possibly negative) population growth in some communities as resource-related employment declines in relation to declining resource development opportunities. In addition, employment opportunities associated with tourism and recreation are more apt to be highly seasonal, lower-skilled, lower-paying positions. With notable exceptions, these positions often attract younger, transient employees who would be less likely to settle in a community on a permanent basis.

Population levels associated with Tongass-related employment were estimated using an input-output model called Interactive Policy Analysis Simulation System (IPASS). Timber supply accounts for essentially all variation in population between

(IPASS). Timber supply accounts for essentially all variation in population between alternatives. Although changes in population are also predicted due to increases in commercial fishing, mining, and tourism/recreation, they are constant across all alternatives. Consequently, changes in timber supply levels would have the greatest effect on population variation among alternatives. This is reflected in Figure 3-91 which shows that Alternative D would lead to the highest population levels. This alternative also has the highest level of timber supply. Alternative A, having the lowest level of timber supply, would result in the lowest population levels.

FIGURE 3-91

AVERAGE ANNUAL POPULATION ASSOCIATED WITH FOREST RESOURCES OVER THE NEXT TEN YEARS



Source: Forest Service IPASS Analysis, March - 1990

LIFESTYLES

AFFECTED ENVIRONMENT

INTRODUCTION

The lifestyles, values, and economic pursuits of Southeast Alaska residents are highly diverse. Various public involvement efforts, as well as recent social research (Alves, 1980; Schroeder, 1989, Glass and Muth, 1989; Muth, 1989), provide evidence of the social meaning ascribed to the Forest by Southeast Alaskan residents, both Native and non-Native. Many people have chosen to live in Southeast Alaska because of the opportunity to participate in resource-extraction occupations; others desire the lifestyles afforded by remote, uncrowded living situations, and the chance to be close to their families and friendship networks. Still other people choose to remain in Alaska because of the hunting and fishing opportunities, and the chance to live in close proximity to a wilderness environment. Many Native residents remain attached to Southeast Alaska because it provides the biophysical context of their cultural heritage. This diversity of attitudes, values, and lifestyles suggests that implementation of a resource management alternative will effect different people differently--some positively, others, perhaps negatively.

LIFESTYLES

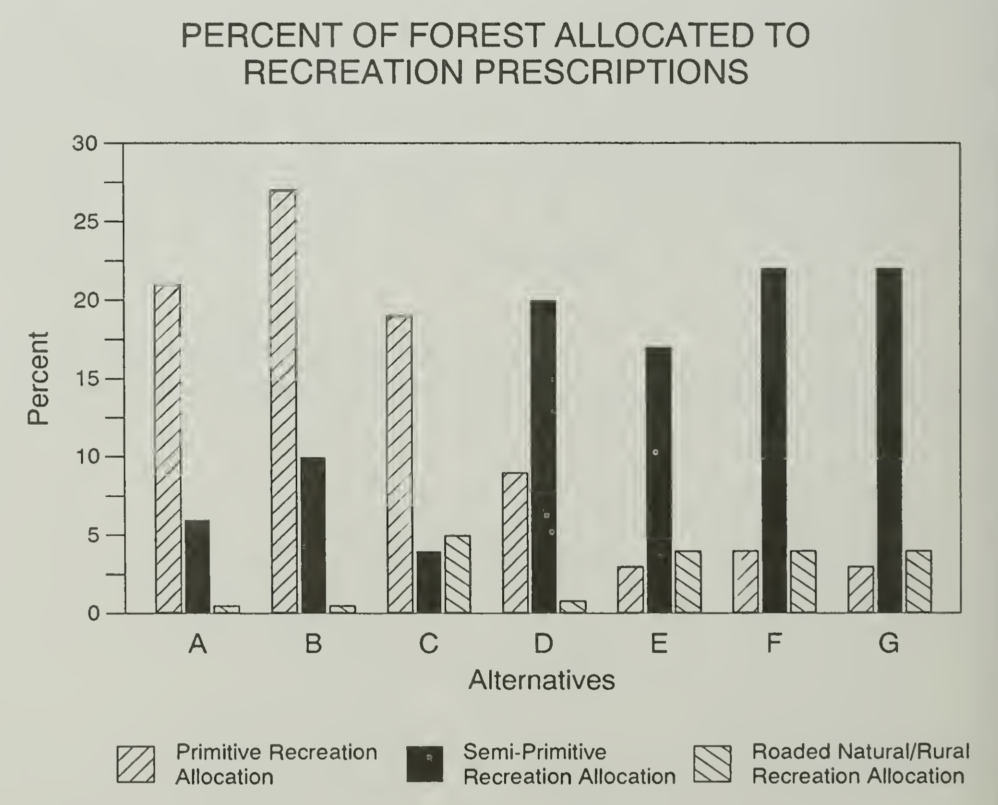
ENVIRONMENTAL CONSEQUENCES

EFFECTS

In addition to changes in employment opportunities, income, and community demographic structure, implementation of different alternatives will have differential effects on other elements of community lifestyles. Most immediately, community recreation and subsistence patterns could be affected by habitat modification, enhanced or restricted access, and competition from outsiders.

In terms of recreation opportunities on the Tongass, Figure 3-92 displays the percent of the Forest allocated to primitive, semi-primitive, and roaded natural recreation. Alternatives A and B allocate the greatest amount of land to primitive recreation while Alternatives E and G provide the least. Alternatives F and G provide greater opportunity for semi-primitive recreation experiences, while A and C provide the least. Roaded natural/rural recreation opportunites are projected to occur with greatest abundance under Alternative C, and least available under Alternative A. Alternatives A and E provide for the most Wilderness opportunities--7.2 million acres.

FIGURE 3-92



Source: Revision Database Q249C1, March - 1990

Abundance of fish, game, and plants; access, and the lack of competition are important elements that ensure the continuation of subsistence harvest. Due to the potential harvest of resurces by non-rural and rural residents outside of their home ranges, and due to the possible reduction and redistribution of wildlife populations resulting from implementation of alternatives, the possibility of a significant restriction of subsistence use of wildlife resources exists for some communities under all alternatives. (This issue is discussed in greater detail in this Chapter under Subsistence.) Alternative A provides the greatest opportunity for continuation of traditional subsistence uses, resource population levels, and results in the least competition for subsistence resources. Alternatives C and D would result in the greatest amount of competition for subsistence resources.

An additional lifestyle consideration of community residents involves esthetic ties to adjacent forest lands. As the public involvement analysis indicates, even individuals residing in communities dependent on the woods product industry often evidenced support for scenic quality, developed and dispersed recreation, maintenance of nearby old-growth habitat, prohibitions on roading, and greater emphasis on wildlife habitat. Alternatives that provide for intensive development of the forest have the potential to affect these esthetic ties to varying degrees. Alternatives emphasizing non-commodity uses--those that provide a minimal level of additional resource development--will provide for the continuation of esthetic and amenity ties that are dependent on a relatively natural or undeveloped forest setting.

COMMUNITY COHESION

AFFECTED ENVIRONMENT

INTRODUCTION

Communities in Southeast Alaska, although often represented by divergent values and preferences, are often characterized by their solidarity, or cohesiveness. This cohesiveness generally results from the social interactions among people within their friendship, kinship, and occupational networks. A sense of community cohesion could be affected by the amount of land available for specific resource uses--especially timber harvest, old-growth habitat, Wilderness, and undeveloped areas.

It is anticipated that polarization would increase as implementation occurs of an alternative that approaches either end of the range in terms of acres allocated to one or more of these uses. In alternatives that provide a management regime representing a more balanced mix of community preferences, polarization, while not expected to disappear, would not be present in the same degree.

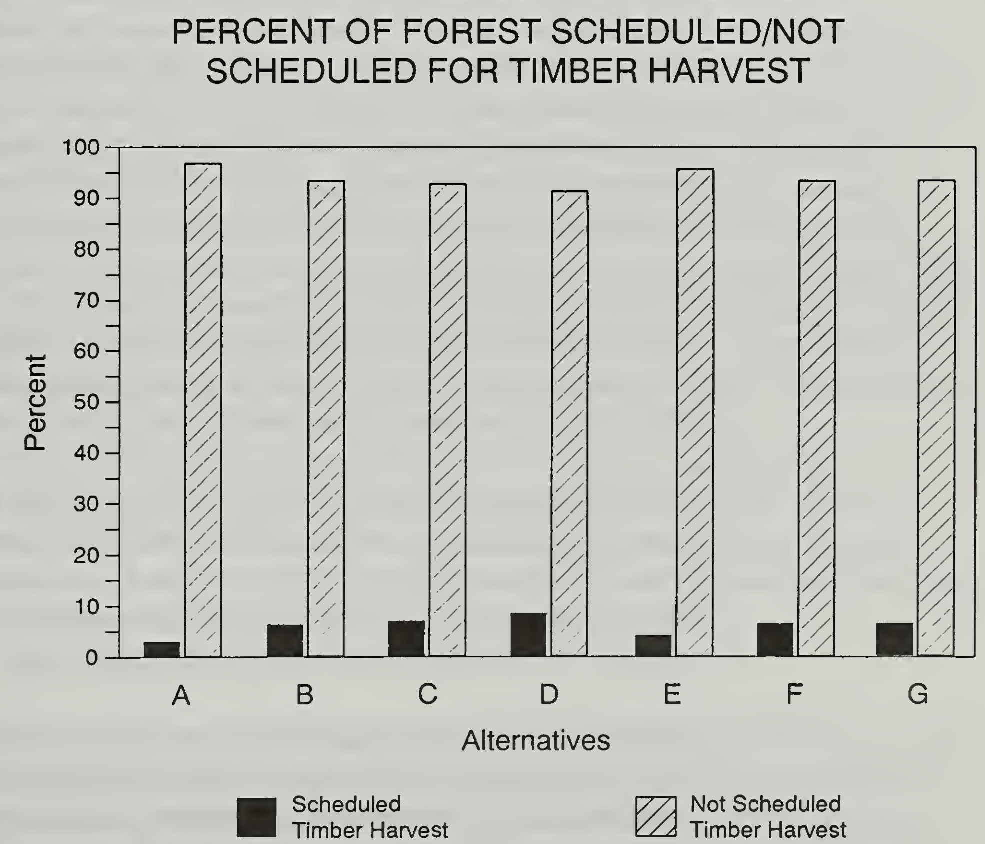
COMMUNITY COHESION

ENVIRONMENTAL CONSEQUENCES

EFFECTS

As displayed in Figure 3-93, Alternatives A and E provide the least amount of acres suitable for timber harvest activities on the Forest. Alternatives C and D provide the most acres selected for timber harvesting. The greatest amount of land allocated to undeveloped areas is found in Alternatives A and B. Alternatives C and G schedule the greatest amount of suitable land for timber harvesting. Evenso, this represents less than 10 percent of the Forest. The cohesiveness of local communities will be dependent on the degree to which the selected alternative allocates land and resources to the mix of values and preferences held by community residents.

FIGURE 3-93



Source: Revision FORPLAN reports, March - 1990

COMMUNITIES

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Settlements in Southeast Alaska range in size from one person living in a sheltered bay to more than 23,000 people living in a full-service community. Although some communities are on Forest road systems, most settlements are accessed primarily, if not exclusively, by aircraft or boat. This relative degree of remoteness, combined with the considerable scenic and recreation opportunities provided by the Tongass National Forest, is sought by many wanting a more self-reliant lifestyle. Residents are often quick to point out the quality of life found in Southeast Alaska outweighs the possible disadvantages of seasonal employment, lack of jobs, cost of importing goods and services, transportation, and weather.

Southeast Alaska communities exhibit varying degrees of economic development and diversity; while fishing, timber, tourism, mining and government are the major economic sectors, the importance of these activities is characterized by considerable local variability. Some communities have little or no local economy in the conventional sense and rely heavily on local fish and game resources. In these cases, sources outside the community play a major role in supplying goods and services that cannot be obtained from local subsistence. Some community use activities depend upon a single economic activity which supports a viable local economy while others have a full range of economic variability.

Most, if not all, Southeast Alaska communities have varying and divergent opinions on how the Forest should be managed. Rarely is unanimous community concensus on even one issue achieved as evidenced by the comments provided. This reflects conflicting values held by the resident population.

A number of individuals from Southeast communities provided written comment about the planning issues for the Revision Draft Environmental Impact Statement. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments should not be considered a reflection of unanimous community opinion (See Appendix A for details regarding issues).

Information from the Tongass Resource Use Cooperative Survey (TRUCS) was used to determine areas used by communities for recreation and subsistence purposes. This information is considered a "snapshot" in time reflecting subsistence use statistics for only a brief time during which subsistence harvest of the resources has occurred. The lists are not intended to be exhaustive.

Alternative maps were referred to to determine the level of development that would take place in areas used by communities for subsistence and recreation. For those alternatives where areas would be allocated to Wilderness, Wilderness

National Monument or Nonwilderness National Monument, the level of development is indicated by a "W" for "Wilderness." No road construction or timber harvesting would occur in these areas. For those alternatives where areas would be allocated to Research Natural Area, Primitive Recreation, Old-Growth Habitat, Beach Fringe and Estuary, Enacted Municipal Watersheds, Stream and Lake Protection, Special Areas, or Semi-Primitive Recreation, the level of development is indicated by an "N" for Natural Setting. Roads would not be constructed to access timber and timber harvesting would not be scheduled in these areas. For those alternatives where areas would be allocated to Experimental Forests, Scenic Viewshed, Roaded Natural/Rural Recreation, or Visual-Timber, the level of development is indicated by an "M" for Moderate Development. While roads would be constructed and timber would be harvested in these areas, the primary emphasis is on visual quality and recreation. For those alternatives where areas would be allocated to Timber Production or Minerals, the level of development is indicated by an "I" for Intensive Development. The primary emphasis in these areas is on timber harvesting and/or mineral exploration and development and would include road construction.

Information regarding community structure and characteristics comes from three sources: 1) "*Southeast Alaska Rural Community Resource Use Profiles,*" A Report to the Board of Fisheries, February 1989. Alaska Department of Fish & Game Division of Subsistence Technical Paper Series; 2) "*Demographic Background Material for 30 Southeast Alaska Communities*" by Robert F. Schroeder, Ph.D. Report to the Alaska Board of Fisheries Meeting, Juneau, Alaska, February and March, 1989. Division of Subsistence Alaska Department of Fish and Game. February, 1989; 3) "*Community Reports Tongass Resource Use Cooperative Survey.*" September 1988. Institute of Social and Economic Research, University of Alaska Anchorage in cooperation with U.S. Forest Service, Division of Subsitence, Alaska Department of Fish and Game.
Outlined in the following paragraphs are the structure, characteristics, and opinions of communities in Southeast Alaska followed by the effects of alternatives. Communities listed are those visited by the Tongass Resource Cooperative Survey (TRUCS) of 1987 with the addition of Juneau, and Ketchikan. The communities discussed are listed in alphabetical order.

Angoon

Angoon, located on the west coast of Admiralty Island at the mouth of Kootznahoo Inlet began as a winter village for the Tlingit Indians. Industry first developed with establishment of a whaling station at nearby Killisnoo, but the whaling industry did not last long. The company then switched to herring processing, but eventually went bankrupt in 1885. Another processing plant followed and prospered, until it was closed in 1930.

The only community on Admiralty Island, Angoon, has a population of 528. Angoon remains a traditional Tlingit Indian Village with 78 percent of the

population being Alaska Native. Traditional Tlingit customs are more prevalent here than in other Southeast communities. Commercial fishing is a major source of income for Angoon, and many residents are commercial hand trollers. Due to competition from larger fishing boats, a shortened season, and closure of some areas, fishing does not provide a strong economic base for the community.

The major sectors of Angoon's economy are educational services, fisheries, construction, and retail trade. Employment in all sectors of Angoon's economy are highly seasonal. Unemployment in Angoon is high throughout the year. Problems associated with high unemployment are compounded by the high cost of living. Subsistence hunting and fishing are a vital source of food in Angoon as well as being an important part of the lifestyle and culture.

Certain Angoon residents expressed a desire to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. These same residents also indicated they want the 4.5 billion board feet per decade timber sale program reduced. They do not want additional roads, log transfer facilities nor do they want to be connected to other existing roads.

Admiralty Island remains Wilderness in all alternatives and no development will be allowed (Table 3-216). Catherine Island is allocated to moderate development in Alternatives A, B, E, F and G, and the Sitkoh Bay area is allocated to intensive development in Alternatives C, D, E, F and G.

TABLE 3-216
LEVEL OF DEVELOPMENT IN AREAS USED BY ANGOON RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Admiralty	W	W	W	W	W	W	W
South Chichagof	M	M/I	I	I	I	I	I
North Baranof	M	M/I	I	I	I	I	I
Catherine Island	M	M	M	I	M	M	M

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Coffman Cove

Coffman Cove is located on northeast Prince of Wales Island. The population of 224 includes no Alaska Natives. The settlement of Coffman Cove occurred in 1956 with development of a logging camp. Many of the logging camp residents reportedly moved to the Cove from other camps on Prince of Wales Island.

Major sectors of the Cove's economy are logging, retail trade, fishing, and education services. Employment is highly seasonal.

Coffman Cove residents who commented on the issues indicated that the Forest should be managed both for scenic quality and timber harvesting. Community opinion was split on the topic of recreation with about half wanting more emphasis placed on recreation and half being satisfied with the current management emphasis. Regarding fish, wildlife, and subsistence, Coffman Cove residents who responded indicated that current management emphasis was adequate. These individuals want the current 4.5 billion board feet per decade timber sale program to continue and favor additional roads, transfer facilities and connecting existing roads. However, residents are split in their opinion about mineral exploration and development with some wanting more emphasis, others less, and still others wanting a mix of emphasis. Those who responded are satisfied with the amount of Wilderness currently designated and indicated that a combination of timber, mining, and other commodity industries with tourism, recreation and fishing would be the most desirable use of Forest resources.

Alternatives A, B, and E can effect the economy of Coffman Cove as development is restricted in these alternatives (Table 3-217). Alternatives C, F, and G reflect no change in development opportunities while Alternative D provides the greatest opportunity for development.

TABLE 3-217
LEVEL OF DEVELOPMENT IN AREAS USED BY COFFMAN COVE RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
NE Prince of Wales	M/I	M/I	I/M	I	M/I	M/I	M/I
El Capitan Pass	W/M	I/N	I	I	W/I	I/N	I/N
Sarkar	W	N	N	I	W	N	N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Craig

Located on a tiny island connected to Prince of Wales Island by a causeway, Craig's population is 1,182. First used by Tlingit Indians for fishing camps and seasonal villages, the community developed with the commercial fishing industry. A saltery was built in 1907; a cold storage plant in 1908. Craig expanded and declined with fluctuations in the fishing industry. In recent years, the population has been rising due to improved transportation, revitalization of the cold storage plant, timber harvesting, and expanded moorage facilities. Alaska Natives account for 28 percent of the population.

The major sectors of Craig's economy are retail trade, fishing, and timber products. Employment is seasonal in fishing, timber, retail, and construction sectors.

Craig residents who responded to the issues want to be able to harvest timber along the Alaska Marine Highway routes, roads, and streams and around their community. However, they also requested that additional emphasis be placed on recreation, fish, and old-growth habitat near their community. Opinions were divided on the emphasis to be placed on subsistence - half wanted more, half wanted less. Respondents requested the 4.5 billion board feet per decade timber sale program be reduced. They favor the current emphasis on mineral exploration and development however, they requested additional Wilderness area designations. Residents who responded to the issues requested that management emphasize tourism, wildlife, recreation, and subsistence sectors of the economy.

Alternatives D, C, and E provide the greatest opportunities for development while all other alternatives, particularly Alternative A, reflect a decrease in development opportunities (Table 3-218). This will effect the timber sector of Craig's economy to varying degrees.

TABLE 3-218
LEVEL OF DEVELOPMENT IN AREAS USED BY CRAIG RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Karta	W	N	N	I/N	W	N	N
Kasaan Penn.	M	M	M	I	M	M	M
Tolstoi Bay	M	M	M	I/M	M	N	N
Twelvemile Arm	M	M	I	I	I	I	I
McKenzie Inlet	M/I	I	I	I	I	I	I
Polk Inlet	I/M	I	I	I	I	I	I
Sea Otter Sound	M/I	M/I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Edna Bay

Edna Bay is located on SE Kosciusco Island, west of Prince of Wales Island, north of Sea Otter Sound. Its population is 69. Edna Bay has no Alaska Native population. Originally, Tlingit Indians from West Prince of Wales Island used Edna Bay on a seasonal basis. In 1943, a logging camp was established when the demand for aircraft-quality spruce was high. Logging facilities included

housing, a few roads and a log transport site. When the last workers left the camp, all buildings were burned. In 1977, the State selected part of the Tongass National Forest at Edna Bay, with the U.S. Forest Service reserving two administrative sites. In 1982, the State sold several lots around the Bay to private landowners; since then, many permanent homes have been built.

Sectors of Edna Bay's economy include, fisheries, education services, construction, business and repair services. Employment in all these sectors is highly seasonal.

Edna Bay residents who responded to the issues requested that additional emphasis be placed on scenic resources, fish, old-growth habitat around their community, and subsistence. Community opinion was split on recreation with half wanting more emphasis and half satisfied with the current recreation emphasis. Similarly, half of the residents were satisfied with the current emphasis on timber harvesting while half wanted less emphasis. Respondents do not want additional roads, log transfer facilities, or connections to other existing roads. They are opposed to emphasizing access for mineral exploration and development. Half of those who responded want additional Wilderness while half are satisfied with the amount currently designated. They want management to emphasize tourism, wildlife, recreation and subsistence economic sectors.

Table 3-219 displays several important visual, recreation, and subsistence areas for Edna Bay. These areas are generally best supported by Alternatives A, E, F and G where no timber harvest will occur in much of Calder/Holbrook and Sarkar Lakes areas.

TABLE 3-219
LEVEL OF DEVELOPMENT IN AREAS USED BY EDNA BAY RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Sea Otter Sound	M/I	M/I	I	I	I	I	I
Devilfish Bay	W	I	I	I	W	N	N
Calder/Holbrook	W	N	I	I	W	N	N
Shakan Bay	W	N	I	I	W	N	N
Shipley Bay	W	N	I	I	W	N	N

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Elfin Cove

Located on northwest Chichagof Island, Elfin Cove is a small fishing town with 60 residents. One percent of the population is Alaska Native. The first permanent operations at the cove were in 1927, when a fish buyer established a business

there. Although the year-round population is small, Elfin Cove is filled with activity during the fishing season. Many Pacific Northwest fishing vessels use the cove during the summer months. A fish buyer, store, and restaurant operate seasonally. Elfin Cove is still a base for fishing in the Icy Straits area.

Principal economic sectors for Elfin Cove include fisheries, educational services, and transportation, communications, and utilities. Employment is highly seasonal in all sectors.

Elfin Cove residents who responded to the issues requested that the 4.5 billion board feet per decade timber sale program be reduced and that the long-term contracts, and Tongass Timber Supply Fund be terminated.

Alternatives A, E and to a great extent, B, maintain current wildlife and scenic values (Table 3-220). Alternatives G, F, C, and D, respectively, will likely have increasing negative effects on expressed community values and lifestyles.

TABLE 3-220
LEVEL OF DEVELOPMENT IN AREAS USED BY ELFIN COVE RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Port Althorp	W	N	M	N	W	M	M
Idaho Inlet	W	N	N	N	W	N	N
Inian Island	W	N	N	N	W	N	N
Lemesurier Island	W	N	N	N	W	N	N
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I	I
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Gustavus

Gustavus is located in northern Southeast Alaska on the north shore of Icy Straits east of the entrance to Glacier Bay; its population is 158. Eight percent of the population is Alaska Native (TRUCS, 2/89). At the turn of the century, a group of agricultural homesteaders established Gustavus. They supplied meat and produce to Juneau until the 1950's. World War II brought development to Gustavus in the form of an airstrip and FAA communications facilities. Due to Juneau's airport being fogbound much of the time, Gustavus was also the refueling point for commercial airlines on their way from Seattle to Anchorage.

Nearby Glacier Bay National Park was established in 1937. In recent years, Gustavus has developed primarily as a fishing and agricultural community and as the main air access point for the National Park.

TRUCS (1987) found fisheries, entertainment, recreation and tourist services, and transportation, communications and utilities to be Gustavus's principal economic sectors. Gustavus's economy is highly seasonal in all sectors.

Gustavus residents who responded requested that additional emphasis be placed on scenic quality, recreation, fish, old-growth habitat and subsistence. They want the 4.5 billion board feet per decade timber sale program reduced, and the long-term contracts and timber supply fund terminated. Those who responded do not want more roads, log transfer facilities, or connection to other existing roads. They favor existing emphasis on mineral exploration and development and want additional areas designated as Wilderness. Respondents requested that management emphasize tourism, wildlife, recreation, and subsistence economic sectors.

Table 3-221 displays areas used by Gustavus residents for recreation and subsistence. Alternatives A and E would best provide for maintenance of these areas. Alternatives B, F, G, C and D, respectively, would likely have increasing negative effects on recreation and subsistence areas.

TABLE 3-221
LEVEL OF DEVELOPMENT IN AREAS USED BY GUSTAVUS RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I	I
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M
Tenakee Inlet	N/W	M/N	I	I	I/W	I/N	I/N
Port Althorp	W	N	M	N	W	M	M
Idaho Inlet	W	N	N	N	W	N	N
Inian Island	W	N	N	N	W	N	N
Lemesurier Island	W	N	N	N	W	N	M

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Haines

Haines is located in the northern portion of southeast Alaska near the north end of Lynn Canal on the Chilkat Peninsula. It is surrounded by State land. The Tongass lies to the south. Haines is one of three Southeast communities connected by road to Canada and the Lower 48. The other two communities are Hyder and Skagway. The population of the city is 1,154; the outer Haines area is home to 684 people. Alaska Natives comprise 9 percent of the Haines area population.

Originally the Haines area was settled by the Chilkat Tlingits. These Natives are now divided into two groups: the Chilkats of the Chilkat River, with Klukwan being the major population center, and the Chilkoots living in and near Haines. Haines itself was a trade center and mission site. The Haines lumber mill, which had been closed, reopened in November 1988. The new mill, called Chilkoot Lumber, currently employs 100 workers and produces chips, cants, and dimensional lumber. Presently, most of the timber supply for this mill comes from the Stikine and Ketchikian Areas of the Tongass.

Haines' principal economic sectors are retail trade, construction, fisheries, and business and repair services. Its economy is highly seasonal in the retail, fishing, forestry, construction, and tourism sectors.

Opinion in Haines was split regarding recreation management with half wanting more emphasis on recreation and half satisfied with the current mix of emphasis. Residents who responded to the issues recommended that old-growth habitat near their community be maintained and that more emphasis be placed on subsistence. They were divided on timber managment with half wanting the same emphasis on timber and half wanting less emphasis. Those who responded do not want additional roads or additional log transfer facilities nor do they want to be connected to existing roads. Opinion was split regarding Wilderness with half wanting more Wilderness designated and half satisfied with the amount currently designated.

Review of Table 3-222 shows that Alternatives C and D would provide the largest supplies of public timber to the short-term timber sale programs which would best support Haines' timber economic sector. Alternatives A and E would best protect important visual, recreation, and subsistence opportunities.

TABLE 3-222
LEVEL OF DEVELOPMENT IN AREAS USED BY HAINES RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Admiralty	W	W	W	W	W	W	W
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I	I
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M
Tenakee Inlet	N/W	M/N	I	I	I/W	I/N	I/N
Sitkoh Bay	M	M/I	I	I	I	I	I

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Hollis

Hollis is located on East Prince of Wales Island in West Kasaan Bay. The population is 82 with 18 percent being Alaska Natives. Settlement at Hollis began as a mining camp at the turn of the century then developed into a logging camp when logging began in the nearby Maybeso Valley in the mid-1950's. In 1960 when Thorne Bay became center of the logging industry on central Prince of Wales most Hollis residents moved to Thorne Bay. In recent years, Hollis has once again developed as a community, due in part to location of an Alaska Marine Highway terminal there. Roads now connect Hollis with most other communities on Prince of Wales.

Hollis' principle economic sectors include timber, construction, transportation services, highway maintenance, fishing, schools, and retail trade. The economy is highly seasonal in all sectors except government.

The Hollis Community Council, Inc. requested that additional emphasis be placed on managing for scenic resources, recreation, fish. They indicated that current emphasis on subsistence is adequate. The Council requested that the 4.5 billion board feet per decade timber sale program be reduced, and that the long-term contracts and the Tongass Timber Supply Fund be terminated. They do not want additional Wilderness designated.

Hollis' economic sectors would be best supported by Alternative D, and to a slightly lesser extent by Alernatives C, G, and F, respectively (Table 3-223). The Karta Area is either a "no harvest" area or recommended Wilderness in all alternatives except a portion in Alternative D which will help maintain subsistence opportunities for the community.

TABLE 3-223
LEVEL OF DEVELOPMENT IN AREAS USED BY HOLLIS RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	Level of Development by Alternatives						
	A	B	C	D	E	F	G
Karta	W	N	N	I/N	W	N	N
Kasaan Penn.	M	M	M	I	M	M	M
Tolstoi Bay	M	M	M	I/M	M	N	N
Twelvemile Arm	M	M	I	I	I	I	I
McKenzie Inlet	M/I	I	I	I	I	I	I
Polk Inlet	I/M	I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Hoonah

Hoonah is located along Icy Strait on the northeast shore of Chichagof Island. Hoonah is the principal Tlingit village for the Glacier Bay/Icy Straits areas. Sixty-two percent of its population of 736 is Alaska Native.

Tlingit Indians of the Glacier Bay area were forced from their homes by the last glacial advance. One group settled near the mouth of Port Frederick and established Hoonah. They were primarily a hunting people and lived off the varied resources of the area. Commercial fishing began with the development of canneries near Hoonah in the early 1900's. Recently, Hoonah has become the center of logging activities on north Chichagof Island, and a logging camp has been constructed nearby. Logging is taking place on National Forest System Lands and has been concluded on land owned by the Huna Totem Corporation, the ANCSA village corporation in 1989. A religious farming community has been established at Game Creek, just south of Hoonah.

Hoonah's principal economic sectors are fish and fish processing, retail trade, and forestry. Its economy is highly seasonal in all sectors. Subsistence is a part of many residents' lifestyles and cultural heritage. Most families rely on traditional food gathering for a substantial part of their diets (Alaska Department of Community and Regional Affairs, 1983).

Hoonah residents who commented on the issues responded favorably to harvesting timber along Alaska Marine Highway routes, roads, streams and around their community. Opinion regarding recreation was split with half wanting more empahsis on recreation and half satisfied with the current mix of emphasis. Respondents want additional emphasis placed on fish and on old-growth habitat near their community. Hoonah City Council requested that subsistence resources be emphasized. Individual respondents want the current timber sale program

to continue and believe the Forest Service has an obligation to maintain local and regional economies by continuing the long-term timber sale contracts and the Tongass Timber Supply Fund. They favor additional roads, transfer facilities and encourage connecting existing roads. They are satisfied with the current amount of Wilderness designated and want the tourism, recreation, and fishing economic sectors emphasized.

Table 3-224 shows that Alternatives C, D, F and G will likely meet employment needs and lead to an expanded economy. However, these alternatives will also negatively effect the favored areas of Point Adolphus and Sitkoh Bay. Alternatives A, and B provide protection of resources in these two areas.

TABLE 3-224
LEVEL OF DEVELOPMENT IN AREAS USED BY HOONAH RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Port Althorp	W	N	M	N	W	M	M
Idaho Inlet	W	N	N	N	W	N	N
Inian Island	W	N	N	N	W	N	N
Lemesurier Island	W	N	N	N	W	N	N
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I	I
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M
Tenakee Inlet	N/W	M/N	I	I	I/W	I/N	I/N
Sitkoh Bay	M	M/I	I	I	I	I	I
Admiralty	W	W	W	W	W	W	W

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Hydaburg

Located on the southwest side of Prince of Wales Island, Hydaburg has a population of 379. Eighty-seven percent of this population is Alaska Native (TRUCS, 2/89).

During the seventeenth century, Haida Indians left the Queen Charlotte Islands and eventually settled on southern Prince of Wales Island. By 1910, there were three Haida population centers on Prince of Wales Island; in 1911 these villages combined to form Hydaburg which developed into a fishing community. Seafood processing was active from 1938 until 1982 when a fire destroyed the cannery. A new seafood processing plant was built and is expected to result in future economic and population growth.

TRUCS (1987) lists the major sectors of Hydaburg's economy as fisheries, forestry, and educational services. Employment is highly seasonal in all these sectors.

Hydaburg residents who responded to the issues indicated the current mix of management for fish, wildlife and timber harvesting is sufficient and want to see the current timber sale program continued. Similarly, they believe the Forest Serivce has an obligation to maintain local and regional economies by continuing the long-term timber sale contracts and the Tongass Timber Supply Fund.

They are generally satisfied with existing road management, emphasis on mineral exploration and development, and the amount of Wilderness currently designated.

Alternatives B, C, D, E, F, and G provide for the development of timber resources needed to support the forestry sector of Hydaburg's economy while Alternative A provides moderate levels of protection for subsistence resources (Table 3-225).

TABLE 3-225
LEVEL OF DEVELOPMENT IN AREAS USED BY HYDABURG RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Twelvemile Arm	M	M	I	I	I	I	I
McKenzie Inlet	M/I	I	I	I	I	I	I
Polk Inlet	I/M	I	I	I	I	I	I
Kasaan Penn.	M	M	M	I	M	M	M

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Hyder

Located in the southern portion of Southeast Alaska, Hyder is at the northern end of Portland Canal on the fringe of the Misty Fiords National Monument and is less than 2 miles from the town of Stewart, British Columbia. Hyder is one of three communities connected by road to Canada. The other communities are Haines and Skagway. One percent of the population of 78 is Alaska Native.

Hyder began as a mining town before the turn of the century. It developed as a supply point for the Canadian mining district with a small amount of mining also done in the Hyder area. Most mining ended in the late 1950's. Today, tourism is the town's main industry.

Hyder's main economic sectors are retail trade, construction, transportation, communications, and utilities. Employment is highly seasonal.

The Hyder Community Association, Inc. requested that more emphasis be placed on managing for recreation and that additional road access to recreation areas be provided. They also want additional emphasis on fish and recommend that old-growth habitat near communities be maintained for wildlife. The Association indicated that the current emphasis on subsistence is adequate. They responded favorably to additional roads, transfer facilities, connecting existing roads, and placing more emphasis on mineral exploration and development.

Table 3-226 displays the level of development in areas used by Hyder residents for recreation and subsistence. Alternatives C, D, E, F, and G allow timber harvesting in varying degrees in the upper Chickaman River area. Alternatives A and B do not allow timber harvesting in the upper Chickaman River.

TABLE 3-226
LEVEL OF DEVELOPMENT IN AREAS USED BY HYDER RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Misty Fiords	W	W	W	W	W	W	W
Mud Bay	W	N	M	N	W	M	M
SE Prince of Wales	I/M	I/M	I	I	I	I	I
Kasaan Penn.	M	M	M	I	M	M	M
Naha	W	N	N	I/N	W	N	N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Juneau and Vicinity

The City and Borough of Juneau are located surrounding the Gastineau Channel. The City and Borough are comprised of three communities: Juneau, Auke Bay, and Douglas. Population in 1987 was 23,799, with 11 percent of this population being Alaska Native (ADF&G Community Profiles, 1987).

Originally, Tlingit Indians made seasonal and permanent villages along the north and south coast near the present site of Juneau. Gold discovered in the Juneau area started the mining town in 1880 and the settlement grew rapidly. Two of the world's largest lode gold mines produced over $180 million in gold before finally closing in 1944. Juneau has developed as a government and regional services center, with added economic contributions from fishing and tourism.

Juneau's economy is overwhelmingly supported by government and administration (ADF&G Community Profiles, 1987). Other major sectors include fishing and tourism; minor economic sectors include retail trade, education services, other professional services, construction, and transportation. Mining may soon play an important role due to the new interest in old, previously worked, deposits.

Juneau residents who responded to the issues requested that additional emphasis be placed on scenic resources, recreation, fish, wildlife, and subsistence. Juneau residents are split in their opinion of managing the Forest to emphasize timber harvest. Half want the same mix of emphasis, half want less timber harvest. Those who responded favor additional roads, and connecting

existing roads. They also expressed support for additional emphasis on access for mineral exploration and development.

Alternatives A and E provide the least amount of development in areas used by Juneau residents for recreation (Table 3-227). Alternative D would result in the greatest amount of development followed in decending order by Alternatives C, F, G, and B, respectively.

TABLE 3-227
LEVEL OF DEVELOPMENT IN AREAS USED BY JUNEAU RESIDENTS FOR RECREATION

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Mansfield Penn.	M	M	M	I/M	M	M	M
Berners Bay	W	N/M	M	M	W	N/M	N/M
Young Bay	W	N	M	M	W	N	N
Admiralty Island	W	W	W	W	W	W	W
St. James Bay	M	M	N	I/M	M	N	N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Kake

Located on west Kupreanof Island, Kake has a population of 645 people, 70 percent of whom are Alaska Native.

Tlingit Indians built villages and fishing camps in the Kake area which were consolidated in the late 1800's. Since then, the community has developed an economy based largely on the commercial fishing industry. A school and store were built in 1891; a cannery in 1912. A cold storage, built in 1980, is still in operation. Logging began in the 1940's and continues to provide some employment opportunities for Kake residents. Most of the logging in recent years has taken place on lands owned by the Village Native Corporation. In the early 1980's Kake experienced a severe housing shortage.

Kake's major economic sectors are fishing and fish processing, and transportation, communications, and education services. Employment is highly seasonal. Much of Kake's population depends on subsistence fishing and hunting.

Although Kake residents did not comment on the planning issues, they have identified a number of areas that are important to them for recreation and subsistence (Table 3-228). All alternatives maintain Admiralty Island in a Wilderness designation. With exception of Alternative D, all alternatives allow no timber harvesting in the Rocky Pass area. Intensive development is allowed in the North Kuiu and North Kupreanof areas in Alternatives C, D, E, F, and G.

These areas are allocated to less intensive development in Alternaives A and B.

TABLE 3-228
LEVEL OF DEVELOPMENT IN AREAS USED BY KAKE RESIDENTS FOR SUBSISTENCE AND RECREATION

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Admiralty	W	W	W	W	W	W	W
N. Kuiu Island	M/I	I/M	I	I	I	I	I
N. Kupreanof	I/M	I/M	I	I	I	I	I
Rocky Pass	W	N	N	I	W	N	N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Kasaan

The eastern side of Prince of Wales Island is the location of Kasaan. Forty-three percent of its population of 40 is Alaska Native.

The Haida village of Kasaan was settled at its present site around 1900. The original village had been located seven miles from this site. A sawmill and school were built in 1892, with a post office being built in 1900. Canneries were the major industry, operating intermittently from 1901 to 1953.

TRUCS (2/89) lists the following economic sectors for Kasaan: fisheries, educational services, and local government. Employment in the fishing and school sectors are highly seasonal.

Kasaan residents expressed a desire to reduce the 4.5 billion board feet per decade timber sale program and requested emphasis on access for mineral exploration and development.

The greatest amount of development in areas used by Kasaan residents for recreation and subsistence will occur in Alternatives D and C followed in decreasing levels of intensity by Alternatives E, F, and G, respectively (Figure 3-229). The least amount of development will occur in Alternatives A and B.

TABLE 3-229
LEVEL OF DEVELOPMENT IN AREAS USED BY KASAAN RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Twelvemile Arm	M	M	I	I	I	I	I
Polk Inlet	I/M	I	I	I	I	I	I
McKenzie Inlet	M/I	I	I	I	I	I	I
Cholmondely	M	I	I	I	I/M	I/M	I/M
Tolstoi Bay	M	M	M	I/M	M	N	N
Thorne Arm	M/I	I/M	M/I	I	I/M	I/M	I/M

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Ketchikan

Revillagigedo Island is the location of Ketchikan. Ketchikan and vicinity include Ketchikan, Saxman, Mountain Point, Clover Pass, Ward Cove, and Herring Cove which are located on the Ketchikan road system, and Pennock Island. The population of Ketchikan and vicinity is 12,705. Ketchikan itself has a native population of 15 percent.

The Ketchikan area was a summer fishing camp for the Tlingit Indians. Development began with a saltery at the mouth of Ketchikan Creek. Ketchikan was a boom town in the late 1800's. Since the early 1900's, timber products have been an important economic influence in Ketchikan. In 1954, a world-scale pulp mill was built in Ward Cove. Due to its location as a transportation center, fishing center, and focus for the subregion's timber industry, Ketchikan grew rapidly in the 1950's. Recently, mining has grown in economic importance, along with government, tourism, and services.

ADF&G Community Profiles (1987) listed the following sectors for Ketchikan's economy: Crafts, operators and laborers, professional and technical, service, clerical, sales, agricultural and forestry. Employment in the fishing industry tends to be seasonal. The economy, in general, is diverse enough to provide stability in the professional, technical, and service sectors.

Individual respondents to the issues expressed an interest in being able to harvest timber along Alaska Marine Highway routes, roads, and streams, and around their community. However, Ketchikan Chamber of Commerce recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality and to display a multiple-use forest.

Ketchikan State Parks Advisory Board recommended additional road access to recreation areas and the Chamber recommended developed recreation sites.

Ketchikan residents who responded to the issues were satisfied with the current management emphasis on recreation.

Individual respondents requested that greater emphasis be placed on fish, and maintenance of old-growth habitat near their community for wildlife. The Chamber of Commerce indicated that the current management emphasis for wildlife and timber harvesting is adequate. Individuals who responded to the issues along with the Chamber agree that current management emphasis on subsistence is adequate and that timber harvest and road construction have a positive effect on subsistence opportunities. Both want the current timber sale program of 4.5 billion board feet per decade, the long-term contracts and the Tongass Timber Supply Fund to continue.

Individuals who responded to the issues do not want additional roads, log transfer facilities, nor do they want to be connected to other existing roads. However the Chamber of Commerce and the State Parks Advisory Board favor additional roads and want alternatives considered that connect Southeast Alaska to Canada. Ketchikan respondents are split in their opinion regarding mineral exploration and development with half wanting more emphasis and half satisfied with the current level. The Chamber supports the idea of maintaining the current mix of emphasis.

Individual Ketchikan respondents want less Wilderness as does the Chamber. Ketchikan State Parks Advisory Board recommended that portions of existing Wilderness be made available for timber harvest in exchange for other wilderness-like areas. The Chamber supports additional emphasis on timber and mining. However the State Parks Advisory Board wants emphasis on tourism, wildlife, recreation and subsistence. Individuals commented that a balanced combination of timber, mining and other commodity industries with tourism, recreation and fishing would be most desirable.

Misty Fiords will remain Wilderness in all alternatives (Table 3-230). In Alternatives A and E, Naha is also allocated to Wilderness. Moderate to intensive development occurs in all other areas used by Ketchikan residents for recreation.

TABLE 3-230
LEVEL OF DEVELOPMENT IN AREAS USED BY KETCHIKAN RESIDENTS FOR RECREATION

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Thorne Arm	M/I	I/M	M/I	I	I/M	I/M	I/M
Carol Inlet	M/I	I/M	I/M	I	M/I	M/I	M/I
Naha	W	N	M	I/N	W	N	N
Cleveland Penn.	N	M	M	I	M	M/I	M/I
Misty Fiords	W	W	W	W	W	W	W

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Klawock

Prince of Wales Island is the location of Klawock. Forty-five percent of the population of 795 is Alaska Native.

Tlingit Indians have lived in the same area, near the Klawock River for at least 600 years. Present-day growth and development of Klawock began with commercial fisheries, and with the first salmon saltery in Southeast Alaska. Two additional canneries were built in 1920 and 1924 along with an associated sawmill. One cannery continues to operate in Klawock. In 1971, a major sawmill was constructed that operated sporadically. With harvest of Native corporation lands in the vicinity of Klawock, Klawock-Heenya, the ANCSA village corporation, constructed docking and log transfer facilities near the city. Klawock is now the center of the Tlingit population on West Prince of Wales Island.

TRUCS (2/89) found that retail trade, educational services, forestry and fishing were the major economic sectors of Klawock. Employment is highly seasonal in all these sectors.

Klawock respondents to the issues indicated a desire to see more emphasis placed on managing for scenic resources, recreation, and wildlife. The Klawock Cooperative Association recommended that additional management emphasis be placed on subsistence. Individual repondents and the Association want the 4.5 billion board feet per decade timber sale program reduced, long-term contracts and Tongass Timber Supply Fund terminated. While respondents are satisfied with the current amount of designated Wilderness, the Association wants additional Wilderness areas. Individuals want a balance between timber, mining, tourism, recreation and fishing.

Intensive development of areas used by Klawock residents will occur in Alternatives C, E, F, and G (Table 3-231). The least amount of development will occur in Alternative B followed by Alternatives A and D.

TABLE 3-231
LEVEL OF DEVELOPMENT IN AREAS USED BY KLAWOCK RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	Level of Development by Alternatives						
	A	B	C	D	E	F	G
Trocadero Bay	N/I	I/N	I	I/N	I	I	I
Tonoweck Bay	I/M	N/I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Klukwan

Located in northern Southeast Alaska, northwest of Haines on the Chilkat River, Klukwan has a population of 133. Alaska Natives comprise 82 percent of this population.

Because of its location in the Chilkat River Valley, Klukwan, a Chilkat Indian village, has had a long history as a trade center. With the Gold Rush of the late 1800's, the Chilkat Valley was used as a supply route to Dawson in the Yukon. Since then, little development has taken place. The Alaska Chilkat Bald Eagle Preserve was recently established adjacent to the community.

Klukwan's principal economic sectors include transportation, communications and utilities, and health and social services (TRUCS, 2/89). All employment is seasonal.

Kluckwan residents did not comment on the planning issues, however, there are a number of areas they use for recreation and subsistence (Table 3-232). Admiralty Island will remain Wilderness in all Alternatives. The degree of development in other areas varies by alternative with Alternative D allowing the greatest amount of development and Alternative A allowing the least amount of development. Kluckwan is surrounded by State land.

TABLE 3-232
LEVEL OF DEVELOPMENT IN AREAS USED BY KLUKWAN RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Admiralty	W	W	W	W	W	W	W
Tenakee Inlet	N/W	M/N	I	I	I/W	I/N	I/N
Sitkoh Bay	M	M	M	I	M	M	M
Catherine Island	M	M	M	I	M	M	M
Hoonah Sound	M/W	M/I	I	I	I/W	I/N	I/N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Metlakatla

Annette Island in southern Southeast Alaska is the location of Metlakatla. Seventy-three percent of the population of 554 is Alaska Native.

In 1887, a minister of the Church of England and his Tsimshian followers moved from British Columbia in search of religious freedom. They settled in Metlakatla. In 1891, Congress declared Annette Island an Indian Reservation. The community of Metlakatla has prospered largely due to its self-sufficient nature and successful involvement in the commercial fishing and timber industries. The island was used for a brief time as a Coast Guard base and a regional airport. Today, a sawmill, fish hatchery, and cannery provide a substantial economic base.

The same percentage of Metlakatla's population are employed in wood processing and fish processing industries. Commercial fishing and educational services are the other major economic sectors of Metlakatla's economy.

Metlakatla residents did not respond to the issues, however, they identified several areas used for recreation and subsistence (Table 3-233). The greatest amount of development in these areas will occur in Alternative D. All other alternatives allow about the same amount of moderate to intensive development. Misty Fiords will remain Wilderness in all alternatives.

TABLE 3-233
LEVEL OF DEVELOPMENT IN AREAS USED BY METLAKATLA RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Thorne Arm	M/I	I/M	M/I	I	I/M	I/M	I/M
Carol Inlet	M/I	I/M	I/M	I	M/I	M/I	M/I
Misty Fiords	W	W	W	W	W	W	W

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Meyers Chuck

Located 40 miles northwest of Ketchikan on Clarence Strait, on the tip of the Cleveland Peninsula is Meyer's Chuck, population 30. Three percent of the population is Alaska Native.

Beginning as a protected anchorage for fishing vessels, Meyers Chuck developed into a permanent community with the building of a cannery (turn of the century). Postal service began in 1922. Fishing and fish processing, and support services sustained the community until the mid-1900's. Low fish runs and World War II caused most of the population to move away. Recently, the population has begun to grow with fishers, retirees, and a few vacationers.

Education services is the main economic sector of Meyers'Chuck, followed by fisheries, transportation, communications, and utilities, and retail trade. All employment is highly seasonal in nature.

In addition to identifying areas used for recreation and subsistence, certain Meyers Chuck residents responded favorably to existing road management.

Alternatives allowing the greatest amount of development in areas used by Meyers Chuck residents include C, E, F, and G (Table 3-234). Alternatives allowing the least amount of development include A, B, and D.

TABLE 3-234
LEVEL OF DEVELOPMENT IN AREAS USED BY MEYERS CHUCK RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Tolstoi Bay	M	M	M	I/M	M	N	N
Thorne Bay	M	M	M	I/M	M	N	N
Union Bay	N	N	I	N/I	I	I	I
Vixen Inlet	N	N/I	I	N/I	I	I	I
Helm Bay	N	N	N	N	M	M	M
Spacious Bay	M	M/N	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

North Whale Pass

North Whale Pass is located on northeast Prince of Wales Island. The population of 50 residents is five percent Alaska Native. Whale Pass is a former logging camp first established in 1956. In 1982 it was the site of a state land sale which resulted in recent community growth.

North Whale Pass is still economically dependent on the logging industry and is connected to several other Prince of Wales Island communities by the Island road system. The economy has diversified in recent years in the form of a fishing lodge, vacation homes and limited services. A state-owned float plane facility was built in the mid-1980's.

North Whale Pass residents did not respond to the planning issues. Alternatives A, B, and E can effect the economy of North Whale Pass as development is restricted in these alternatives (Table 3-235). Alternatives C, F, and G reflect no change in development opportunities while Alternative D provides the greatest opportunity for development.

TABLE 3-235
LEVEL OF DEVELOPMENT IN AREAS USED BY NORTH WHALE PASS RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
El Capitan Pass	W/M	I/N	I	I	W/I	I/N	I/N
NE Prince of Wales	M/I	M/I	I/M	I	M/I	M/I	M/I
Sarkar	W	N	N	I	W	N	N

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Pelican

Pelican is a fishing village along Lisianski Inlet on the northwest corner of Chichagof Island. Part of the community is built on pilings over the tideland. A boardwalk serves as the town's main thoroughfare. Pelican boasts a population of 243 with the Alaska Native component of the population at 27 percent.

It is believed that west Chichagof area was used by Hoonah and Sitka Tlingit Indians for fishing camps and temporary villages. Settlement in Pelican probably began with mines and fox farms. Canneries began in the area to service the developing commercial fishing industry. Pelican was founded in 1938 by a fisherman who set up a fish buying operation and, eventually, a cold storage at the site. Following initial construction of the community, a school and post office were built. Growth since then has been slow, and linked entirely to the commercial fishing industry. A present-day cold storage provides employment. Some timber harvesting has also taken place in the Pelican area.

Fisheries and fish processing employ the majority of the population of Pelican. Educational services is the other economic sector. Although Pelican Cold Storage is a year-round employer, other employment in Pelican is highly seasonal.

Pelican is not recognized under the Alaska Native Claims Settlement Act as a Native Village, therefore, it has little land base to expand.

Pelican residents who responded to the issues requested that additional emphasis be placed on scenic resources along the Alaska Marine Highway routes, roads, streams and around their community. These individuals also requested that more emphasis be placed on recreation, fish, wildlife, and subsistence. The City of Pelican wants the 4.5 billion board feet timber sale program reduced, long-term contracts, and Tongass Timber Supply Fund terminated. The City does not want additional roads, log transfer facilities or to be connected to existing roads. However, Pelican respondents were split in their opinion regarding road development with half wanting a reduction in developments and half wanting a mix of road development with other Forest uses. Individual Pelican respondents favored maintaining current management

emphasis for mineral exploration and development while the City opposed emphasizing mineral exploration and development. The City wants additional areas designated as Wilderness. Individual respondents want management to emphasize tourism, wildlife, recreation and subsistence economic sectors.

Table 3-226 displays the level of development in areas used by Pelican residents for recreation and subsistence. The West Chichagof/Yakobi area will be designated Wilderness in all alternatives. All areas are allocated to Wilderness in Alternatives A and E. The greatest amount of development will occur in Alternatives C, F, and G.

TABLE 3-236
LEVEL OF DEVELOPMENT IN AREAS USED BY PELICAN RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Port Althorp	W	N	M	N	W	M	M
Idaho Inlet	W	N	N	N	W	N	N
Inian Island	W	N	N	N	W	N	N
Lemesurier Island	W	N	N	N	W	N	N
W. Chichagof/ Yakobi	W	W	W	W	W	W	W
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Petersburg and Vicinity

With a population of 4,149, Petersburg is located on the northern tip of Mitkof Island in east-central Southeast Alaska. Fourteen percent of Petersburg's population is Alaska Native. The community of Kupreanof is located less that one mile from Petersburg, across Wrangell Narrows on Kupreanof Island. This settlement is economically tied to Petersburg where most residents find employment, purchase goods, and attend school.

Founded by Norwegian, Peter Buschmann in 1899, Petersburg incorporated in 1906. More Norwegians followed and settled a Scandinavian-style community. Petersburg grew around a cannery, and the site quickly became a center for fishing, fish processing, and transportation. A sawmill was added, as were a packing house and docks. Continual growth has occurred in Petersburg through the years except for a slight decline in the 1950's. Today, Petersburg is an active community with fishing, fish processing, and timber being its predominant industries. Tourism has become an increasing source of revenue during the summer months.

Petersburg's main economic sector is seafood processing and manufacturing with the various governments being the second largest employer. Retail trade and construction make up the other economic sectors. Employment is seasonal in the manufacturing, retail, and construction sectors.

Petersburg residents who responded to the issues want more emphasis on scenic resources, recreation, fish, and wildlife. Opinion was split on subsistence with half wanting more emphasis on subsistence and half wanting less. Those who responded requested that the current 4.5 billion board feet per decade timber sale program continue along with the long-term timber sale contracts and the Tongass Timber Supply Fund. Residents were split in their opinion of road development with half recommending a reduction in emphasis and half requesting a mix of road development with other Forest uses. Opinion was split three ways regarding mineral exploration and development. Some want more emphasis on mineral exploration and development, others want less, and still others want a mix. Respondents are satisfied with the current amount of designated Wilderness. They want management to emphasize the tourism, wildlife, recreation, and subsistence sectors of their economy.

Moderate to intensive development would occur for all alternatives in all areas used by Petersburg residents for recreation and subsistence (Table 3-237). The greatest amount of development would occur in Alternatives D, C, F, and G. Least development would occur in Alternatives A, B, and E.

TABLE 3-237
LEVEL OF DEVELOPMENT IN AREAS USED BY PETERSBURG RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Drt Strait	M	I	I	I	I	I	I
Portage Bay	M	M	I	I	I	I	I
Thomas Bay	M	M	M/I	I/M	M/I	M/I	M/I
Blind Slough	M	M	M	I	M	M	M
Duncan Canal	W/M	I/M	I/M	I	W/I	M/I	M/I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Point Baker
Port Protection

Separated by 2 miles of water, these communities are located on the north tip of Prince of Wales Island. The combined population of both communities is 93 people, of which 7 percent is Alaska Native. Both communities are similar in history, economy, and use of local resources.

Captain George Vancouver, an early explorer, mapped and named this protected harbor in the late 1700's. The first floating fish packer came to Point Baker to buy fish in 1919 and trade continued until the 1930's. The actual community of Point Baker was not settled until the 1930's when the Forest Service opened the area for homesites.

Port Protection was founded by a man name Johnson when he took refuge in the cove after he had lost a wooden wheel off his boat. Johnson later built a store and a fuel dock and this area became a popular place for trollers to stop enroute to other destinations.

Both economies peak with summer and fall fishing. Most residents own fishing boats and choose to live here for the independent and subsistence lifestyle the area offers. The communities share a post office, store, and a fish and game advisory committee. They have been affected in recent years by logging activities in areas adjacent to them, and the development of a logging camp in nearby Labouchere Bay.

The main economic sector for Point Baker and Port Protection is fishing, followed by retail trade, construction, and education services. Employment is highly seasonal in all sectors.

Community residents who responded to the issues want more emphasis on scenic resources, recreation, fish, wildlife, and subsistence. The Sumner Strait Fish and Game Advisory Committee would also like to see management emphasize wildlife and subsistence. Individual respondents and the Committee want the 4.5 billion per decade timber sale program reduced, and the long-term contracts and Tongass Timber Supply Fund terminated. They do not want additional roads, long transfer facilities or connections to other existing roads. The Advisory Committee is opposed to emphasizing mineral exploration and development and favors additional Wilderness designations as do community residents. Both groups believe a balanced combination of timber, mining, tourism, recreation and fishing would be most desirable for the economy.

The North Prince of Wales Island area will be most intensively developed in Alternative D and will be moderately developed in Alternatives C, E, F, and G (Table 3-238). Alternative A provides the least development of this area. Alternatives A and E allocates South Kuiu and Calder/Holbrook to Wilderness.

TABLE 3-238
LEVEL OF DEVELOPMENT IN AREAS USED BY POINT BAKER/PORT PROTECTION RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	Level of Development by Alternatives						
	A	B	C	D	E	F	G
Red Bay	N/M	M/I	M	I	M	M	M
Point Colpoys	N/I	I/M	M	I	M	M	M
Salmon Bay	N	N/M	M	I	M	M	M
Admiralty	W	W	W	W	W	W	W
South Kuiu	W	I/M	I/M	I	W	I/M	I/M
Calder/Holbrook	W	N	I	I	W	N	N
Sea Otter Sound	M/I	M/I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Port Alexander

Port Alexander is located on the south end of Baranof Island on the west side of Chatham Strait. Six percent of the population of 108 is Alaska Native.

With a protected harbor, Port Alexander attracted fishing boats as early as the 1920's. The community was settled by trollers who fished the Chatham Strait fishing grounds and prospered until the late 1930's. Land-based businesses developed along with the fishing industry. The last 20 years have brought a slow, steady increase in numbers of residents. People choose Port Alexander as a home because of its independent, subsistence lifestyle, and commercial fishing opportunities as well as its remote setting. There are no roads in Port Alexander; travel within the community is by skiff, boardwalks, and footpaths.

Fisheries employ almost three-quarters of the residents of Port Alexander. The other major economic sectors are educational services and local government. All economic sectors except government are highly seasonal.

Port Alexander residents who responded to the issues along with the City of Port Alexander want more emphasis on fish, wildlife, and subsistence. The City wants the 4.5 billion board feet per decade timber sale program reduced and the long-term contracts, and Tongass Timber Supply Fund terminated. The City does not want additional roads, log transfer facilities or connection to existing roads. While the City is opposed to emphasizing mineral exploration and development, individual repondents are split in their opinion with half wanting more emphasis and half wanting a mix. The City wants management to emphasize tourism, wildlife, recreation and subsistence sectors of the economy.

Alternative D will allocate areas used by Port Alexander residents for recreation and subsistence to intensive development (Table 3-239). South Kuiu will be allocated to Wilderness in Alterantives A, and E. However, Alternative E allocates Kelp Bay, South Baranof and North Kuiu to intensive development as do Alternatives C, F, and G. Alternatives A and B allocate these areas to moderate development.

TABLE 3-239
LEVEL OF DEVELOPMENT IN AREAS USED BY PORT ALEXANDER RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Kelp Bay	M	M/I	I	I	I	I	I
Catherine Island	M	M	M	I	M	M	M
South Baranof	M	M/I	I	I	I	I	I
North Kuiu	M/I	M/I	I	I	I	I	I
South Kuiu	W	M	M	I	W	M	M

W = Wilderness   N = Natural Setting (no development)   M = Moderate Development   I = Intensive Development

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, south of Ketchikan. Its population is 266 with 80 percent being Alaska Natives.

Tlingit Indians from the villages of Cape Fox and Tongass chose Saxman as their permanent home in 1894. Fishing and milling timber for themselves and the growing community of Ketchikan were its economic mainstays.

In the late 1930's artifacts and totem poles were retrieved from the original Cape Fox and Tongass village sites and placed in a totem park in Saxman. This park is now a major cultural and tourist attraction.

Being near Ketchikan, Saxman did not develop an independent economy until recently. Although Saxman residents still depend on Ketchikan for most services and employment opportunities, development of a barge terminal, a fishing fleet, and the Cape Fox Village Corporation investments have led to some recent growth in Saxman's population and economic base.

The major economic sector of Saxman is local government, followed by social and health services, retail trade, and fisheries. Saxman's economy is seasonal in all sectors except government.

Saxman residents did not respond to the planning issues. Almost all areas used by Saxman residents are allocated to moderate to intensive development

in all alternatives (Table 3-240). Only Alternatives F and G allocate Tolstoi Bay to a natural setting.

TABLE 3-240
LEVEL OF DEVELOPMENT IN AREAS USED BY SAXMAN RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	**B**	**C**	**D**	**E**	**F**	**G**
Kasaan Penn.	M	M	M	I	M	M	M
Tolstoi Bay	M	M	M	I/M	M	N	N
Carol Inlet	M/I	I/M	I/M	I	M/I	M/I	M/I
Thorne Arm	M/I	I/M	M/I	I	I/M	I/M	I/M
Sea Otter Sound	M/I	M/I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Sitka

Located on the west side of Baranof Island, Sitka is the only community in Southeast Alaska which fronts the open sea. Twenty percent of Sitka's population of 8,196 is Alaska Native. Present-day Sitka, contains a separate Indian Village (Sitka Kwan), within the community.

Originally settled by the Tlingit people, it became the focal point of Russian fur trade in North America beginning in 1741. Russian hunting of the sea otter continued for over 50 years, and almost decimated the resource. With the demise of the fur industry in the 1860's, Russia lost interest in her North American colony.

After fur trade, fishing and fish processing dominated Sitka's economy for a time. Currently Sitka's economy is based on pulp manufacture, tourism, education, commercial fishing and services, local, state, and federal government.

Nearly equal numbers of people are employed in health and social services, retail trade, and educational services with smaller numbers being employed in fisheries and wood processing. Sitka's economy is seasonal in the manufacturing and construction sectors.

Sitka residents who responded to the issues, and the City and Borough of Sitka, requested that additional emphasis be placed on scenic resources. While individuals requested that less emphasis be placed on managing for recreation, the Sitka State Parks Advisory Board requested that additional emphasis be placed on recreation.

The City and Borough wants additional emphasis on fish but individuals are split in their opinion with half wanting more emphasis on fish and half satisfied

with the current management mix. The City and Borough requested additional emphasis on wildlife and the Sitka Advisory Committee requested additional emphasis on subsistence. Individuals are split with some wanting more emphasis on subsistence, some less, and still others satisfied with existing management emphasis.

The City and Borough recommended that the current 4.5 billion board feet per decade timber sale program continue. However, residents were split in their opinion with half wanting the same mix of emphasis and half wanting less timber harvest. Individual respondents favored additional roads, transfer facilities, and encouraged connecting existing roads. Certain residents also support additional emphasis on access for mineral exploration and development. Individuals who responded to the issues want the same amount of Wilderness currently designated but the City and Borough of Sitka has indicated preference for exchanging some wilderness-like areas for portions of existing Wilderness. While individual respondents favored emphasizing timber and mining economic sectors, Sitka State Parks Advisory Board want management to emphasize tourism, wildlife, recreation, and subsistence.

Admiralty Island, West Chichagof/Yakobi will remain Wilderness in all alternatives (Table 3-241). Moderate to intensive development will occur in all alternatives in other areas used by Sitka residents for recreation and subsistence.

TABLE 3-241
LEVEL OF DEVELOPMENT IN AREAS USED BY SITKA RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	**B**	**C**	**D**	**E**	**F**	**G**
Admiralty	W	W	W	W	W	W	W
Sitka Sound	M/N	N/M	M	M/I	M	M	M
South Chicagof	M	M/I	I	I	I	I	I
West Chichagof/ Yakobi	W	W	W	W	W	W	W

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Skagway

Founded in 1896 at the tip of Taiya Inlet at the extreme North end of Lynn Canal, is the town of Skagway. More than 20,000 gold seekers traveled through Skagway on their way to the Klondike Gold Fields. Many miners who arrived in the late fall actually overwintered in Skagway before starting their journeys in search of gold. With the ebbing of the Gold Rush, Skagway's population dwindled.

Today, six percent of Skagway's 585 are Alaska Native. It is the shipping center for zinc and copper from the Yukon. The present mainstay of Skagway's economy is tourism. Approximately 145,000 tourists visit Skagway each year.

Major employment sectors of Skagway are retail trade, entertainment, recreation, and tourist services, and transportation, communications and utilities. Skagway's economy is highly seasonal in all sectors.

Skagway residents who responded to the issues recommended that the Forest be managed for both scenic quality and timber harvesting, with more emphasis on recreation. Community opinion was split on fish management and wildlife management with half wanting more emphasis and half satisfied with existing emphasis. Respondents to the issues requested that the current 4.5 billion board feet per decade timber sale program continue with a mix of management emphasis to include other resources.

Alternatives D, F, and G allocate areas used by Skagway residents for recreation and subsistence to the greatest levels of development while Alternatives A, B, E, and C allocate these areas to the least amount of development (Table 3-242).

TABLE 3-242
LEVEL OF DEVELOPMENT IN AREAS USED BY SKAGWAY RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I	I
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M
SE Chicagof	M	M/I	I/M	I	I/M	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Tenakee Springs

With a population of 95 residents (seven percent Alaska Native), Tenakee Springs is located 50 miles northeast of Sitka on the North shore of Tenakee Inlet (east Chichagof Island). Access to Tenakee is by floatplane or the Alaska Marine Highway.

Historically, Tenakee Springs was a favorite wintering spot for early prospectors and miners. Today, many Tenakee Springs residents are retired and younger families are moving in, attracted by the slower pace of life and opportunities for a subsistence lifestyle. It has the highest percentage of senior citizens of any community in Alaska.

Tenakee is popular with area people and a favorite stop for boaters. A number of Juneau residents maintain second homes there. Logging began at nearby Corner Bay and along the Indian River Road in the early 1970's and continues intermittently.

The major employers of Tenakee Springs are fisheries, retail trade, and local government with all sectors being highly season except government.

Tenakee Springs residents who responded to the issues, and the City of Tenakee Springs, want to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. They want the 4.5 billion board feet per decade timber sale program reduced, and the long-term sales, and Tongass Timber Supply Fund terminated. Neither respondents nor the City want additional roads, log transfer facilities or connections to existing roads. They are opposed to emphasis on mineral exploration and development and favor additional Wilderness designations. They want management to emphasize tourism, wildlife, recreation and subsistence sectors of the economy.

Admiralty Island remains Wilderness in all Alternatives and Mud Bay and Point Adolphus are allocated to Wilderness in Alternatives A and E (Table 3-243). The greatest amount of development in other areas will occur in Alternatives D, C, F, and G. Alternatives A and B maintain the greatest amount of natural settings across all areas used by Tenakee Springs residents.

TABLE 3-243
LEVEL OF DEVELOPMENT IN AREAS USED BY TENAKEE SPRINGS RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Admiralty	W	W	W	W	W	W	W
Mud Bay	W	N	M	N	W	M	M
Point Adolphus	W	M	I	I	W	I	I
Port Fredrick	N	N	I	N/I	I/M	I/M	I/M
Freshwater Bay	M	M	M/I	I	I/M	I/M	I/M
SE Chicagof	M	M/I	I/M	I	I/M	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Thorne Bay

Located at the head of Thorne Bay on eastern Prince of Wales Island is the community of Thorne Bay. Built in 1960 to replace a logging camp previously near Hollis, Thorne Bay has grown as a center of timber harvest activity for the east Prince of Wales Island Area. Since 1960, over 700 miles of road have been developed on the Island. These roads now connect Thorne Bay with most other communities on Prince of Wales Island. State land sales, municipal government, and the development of new economic sectors have led to its present status as a permanent community, although its economy is still tied to the timber industry. The present population of Thorne Bay is 477. Three percent of the population is Alaska Native.

Forestry and wood processing employ the major amount of Thorne Bay's populations with the other major employer being retail trade. Over 80 percent of the population remains in the community year round.

Thorne Bay residents are split in their opinion on management of scenic resources. Half want more emphasis on scenic resources while half want less. Thorne Bay residents who responded to the issues want more emphasis on fish and wildlife but think that current emphasis on subsistence is adequate. They are split in their opinion of emphasis on timber harvesting with half wanting the same mix of emphasis and half wanting less timber harvesting. Those responding to the issues indicated they do not want additional roads, log transfer facilities or to be connected to existing roads. They prefer the same amount of Wilderness currently designated. Some want management to emphasize recreation, tourism and fishing sectors of the economy while others want commodity industries emphasized.

The Karta area is allocated to Wilderness in Alternatives A and E and only in Alternative D will any development occur in this area (Table 3-244). Intensive development will occur in Twelvemile Arm and Polk Inlet in Alternatives C, D, E, F, and G.

TABLE 3-244
LEVEL OF DEVELOPMENT IN AREAS USED BY THORNE BAY RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Thorne Bay	M	M	M	I/M	M	N	N
Tolstoi Bay	M	M	M	I/M	M	N	N
Karta	W	N	N	I/N	W	N	N
Clevland Penn.	M/I	M/I	I/M	M/I	M/I	M/I	M/I
Twelvemile Arm	M	M	I	I	I	I	I
Polk Inlet	I/M	I	I	I	I	I	I

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Wrangell

Originally inhabited by Tlingit Indians, Wrangell is located on the northern tip of Wrangell Island near the Stikine River. Thirty-eight percent of the population of 2,913 is Native Alaskan. This community has flown the flags of three nations, England, Russian, and the United States. The late 19th century saw Wrangell become a supply center for gold miners and prospectors during three gold rushes.

Today, timber, fishing, and fish processing dominate Wrangell's economy. More than 100 residents fish commercially and for nearly 50 percent of them,

its their major source of income. Tourism is also a growing influence in the area.

Wrangell residents who responded to the issues are split in their opinion on managing for scenic resources with half wanting more emphasis and half wanting the Forest to be managed for both scenic quality and timber harvesting. The City of Wrangell recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality. Individual respondents recommended additional emphasis be placed on recreation, particularly developed sites. The City recommended a mix of management emphasis on recreation and other Forest uses including timber harvesting and mining.

While individual respondents recommended greater emphasis on fisheries, the City believes the current mix of management for fish and timber harvesting is sufficient. Individuals want additional emphasis on wildlife habitat. The City favors the current 4.5 billion board feet per decade timber sale program, the long-term contracts, and the Tongass Timber Supply Fund. However, residents are split with half wanting the same mix of timber emphasis and half wanting less timber harvesting. The City favors additional roads, log transfer facilities, and connections to existing roads, particularly a connection to Canada. Individual respondents oppose emphasizing mineral exploration and development while the City favors maintaining current management emphasis for mineral exploration and development. Those individuals who responded to the issues recommended that additional areas be designated as Wilderness while the City believes there is enough Wilderness currently designated and that access and use should be limited to retain pristine characteristics. Individuals were split between emphasizing timber harvesting, mining, and a mix between these and amenity industries.

Admiralty Island, Misty Fiords, and the Stikine River will be allocated to Wilderness in all alternatives (Table 3-245). In addition, Sarkar, North Chichagof, and portions of Anan will be allocated to Wilderness in Alternatives A, and E. The greatest amount of development will occur in Alternatives C, D, F, and G.

TABLE 3-245
LEVEL OF DEVELOPMENT IN AREAS USED BY WRANGELL RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Sarkar	W	N	N	I	W	N	N
Admiralty	W	W	W	W	W	W	W
Sea Otter Sound	M/I	M/I	I	I	I	I	I
N. Chichagof	W	N	M	N	W	M	M
Anan	W/M	N/I	N/I	N/I	W/I	N/I	N/I
Clevland Penn.	M/I	M/I	I/M	M/I	M/I	M/I	M/I
Misty Fiords	W	W	W	W	W	W	W
Stikine River	W	W	W	W	W	W	W

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

Yakutat

Yakutat is located on the mainland in extreme northern Southeast Alaska. Its population is 593; 58 percent of whom are Alaska Native.

Historically, Yakutat began as a Tlingit village site in the mid-1800's and has continued to be an important Native Community. It has developed largely around the commercial fishing industry. Oil exploration caused a brief economic boom in the late 1970's. Timber harvesting in the 1980's increased Yakutat's population and employment. Tourism is an emergent, growing industry in Yakutat, especially since the 80 mile long Hubbard Glacier sealed off the Russell Fiord in 1986. Russell Fiord is no longer sealed off due to the failure of the ice dam blocking its entrance. However, should the Fiord close again, this could have profound effects on Yakutats economic and subsistence lifestyles.

The major employers of Yakutat are fisheries, fish processing, and government with retail trade and forestry being the other economic sectors. Most jobs other than governmental jobs are seasonal.

Subsistence is also an important part of Yakutat's economy with many Tlingits who depend upon the fish of the many surrounding rivers for their livelihoods.

The City of Yakutat and the Yakutat Fishermen's Association requested that additional emphasis be placed on managing for scenic resources. While the Association is satisfied with current mangement emphasis on recreation, the City wants additional recreation emphasis. The City and the Yakutat Fish and Game Advisory Committee requested additional emphasis on fish resources. The City, Advisory Committee, and Association all want management to emphasize wildlife. The City and the Advisory Committee want additional

emphasis on subsistence while the Fishermen's Association believe that current emphasis is adequate.

The City and the Fishermen's Association want the 4.5 billion board feet per decade timber sale program reduced, and the long-term contracts, and Tongass Timber Supply Fund terminated. Community residents were split in their opinion regarding timber harvesting with half wanting the same mix of emphasis and half wanting less timber harvesting. All three organizations requested no additional roads, log transfer facilities, or connections to existing roads. Yakutat is opposed to having the community connected to Canada by road. The City and Fishermen's Association are opposed to emphasizing mineral exploration and development. The City of Yakutat and the Fishermen's Association requested that additional areas be designated as Wilderness and that management emphasize tourism wildlife, recreation, and subsistence economic sectors. Residents are split with some wanting emphasis on recreation, tourism and fishing and others wanting a mix between these and commodity industries.

Only Alternative D allows intensive development in portions of the Yakutat Forelands that are used by Yakutat residents for recreation and subsistence (Table 3-246).

TABLE 3-246
LEVEL OF DEVELOPMENT IN AREAS USED BY YAKUTAT RESIDENTS FOR RECREATION AND SUBSISTENCE

Area	*Level of Development by Alternatives*						
	A	B	C	D	E	F	G
Russell Fiords	W	W	W	W	W	W	W
Yakutat Forlands	W	N	N	N/I	W	N	N
Dangerous River	W	N	N	N	W	N	N

W = Wilderness N = Natural Setting (no development) M = Moderate Development I = Intensive Development

CHAPTER 4

LIST OF PREPARERS

CHAPTER 4

LIST OF PREPARERS

INTERDISCIPLINARY TEAM

Core Team

Steven A. Brink — **Tongass Land Management Plan Revision Team Leader (2/89- present)**

Contributions made:

1. Responsible for the public participation and coordination activiities required, and the preparation of the Environmental Impact Statement and other associated documents, leading to the Revision of the Tongass National Forest Land Management Plan.
2. Responsible for consistency with NFMA and NEPA and other applicable laws and regulations.

Education:

B.S. Civil Engineering, University of California, Davis 1971.

Forest Service: 20 years

Land Management Planning and Engineering Staffs, Washington, D.C. (1 year)
Engineering Staff, Regional Office, San Francisco, CA (2 years)
Engineering Staff, Chatham Area, Tongass NF (4 years)
Logging Systems Specialist, Stanislaus NF (3 years)
Transportation Planner, Six Rivers NF (4 years)
Sanitation Engineer, Inyo NF (1 year)
Transportation Engineer, Eldorado NF (5 years)

David Arrasmith | **Economist/Analyst**

Contributions made:
- Economic analysis
- FORPLAN analysis

Education:
- B.S. Agricultural Economics, University of California Davis, 1981

Forest Service: 9 years
- Economist/Analyst Alaska Region, 2 years
- Economist/Sociologist Eldorado National Forest, 7 years

Norene Blair | **Writer-Editor**

Contributions made:
- Writer/editor

Education:
- B.A. Planning and Administration, University of Oregon, 1968
- M.A. Planning and Administration, University of Oregon, 1970.
- M.S. Forest Management (Silviculture), University of Idaho, 1977.
- Pre-doctoral Studies, Forest Entomology, University of Idaho

Forest Service: 14 years
- Writer-Editor TLMP Revision Team, December 1988 - present.
- Writer-Editor, Supplemental EIS, Alaska Pulp Corporation Long-term Sale Contract (SEIS)
- Land Use Coordination, Columbia River Gorge National Scenic Area
- Writer/Editor/Indexer - Detailer - Ochoco, Siskiyou, and Malheur NF (2 years)
- Forester, Sale Planner/Logging Systems Specialist, Malheur NF (2 years)
- Environmental Coordinator, Burns Ranger District (3 years)
- Forester/Data Base Specialist, Planning Team, Malheur NF (4 years)

Forrest Cole

Timber/Subsistence Coordinator (5/89- present)

Contributions made:

Timber and Subsistence
Juneau/Admiralty Timber & Lands Layers, GIS.

Education:

B.S. Forestry, Northern Arizona University.
Forest Engineering Institute

Forest Service: 17 years

4/1989 - Present - Timber/Subsistence Coordinator, TLMP Revision.
1983-1989 - Timber, Lands, Minerals Staff, Juneau Ranger District, TNF
1980-1983 - Small Sales Forester, Petersburg R.D. Tongass National Forest
1979-1980 - Presale Forester, APC Long-term Sale, Petersburg R.D., Tongass National Forest.
1977-1979 - Presale Forester, Coconino National Forest, Region 3.
1971-1977 - Fire Control, Coconino N.F.

Judy Coose

Administrative Assistant

Contributions made:

Established and maintained the planning records. Provided business support.

Education:

High School diploma.

Forest Service: 8 years

Administrative Assistant, TLMP Revision Team, Juneau Alaska
Engineer Staff Clerk, Supervisor's Office, Ketchikan, Alaska
Support Service Specialist, Supervisor's Office, Ketchikan, Alaska

Other Employment:

Social Security Administration - 4 years, data control and public involvement.

John Day — **FORPLAN Analyst**

Contributions made:
FORPLAN modelling

Education:
B.S. Forest Management, Colorado State University.
M.S. Operations Research/Forestry, Colorado State University.

Forest Service: 2 years
1/2 year, FORPLAN analyst, R10-RO
1 1/2 years, TM/LMP Systems Section, Washington Office (Detached), Ft. Collins, Colorado.

Eugene J. DeGayner — **Resource Information Manager**

Contributions made:
Coordinate GIS activities
Oversee the development of a forest-wide data base for the Revision.

Education:
B.S. Wildlife Biology, University of Minnesota, 1980
M.S. Wildlife Biology, University of Minnesota, 1982

Forest Service: 6 years
Wildlife Biologist, Tongass National Forest, Ketchikan Area (6 years)

Rick Griffen — **Computer Programmer Analyst**

Contributions made:
Database Management

Education:
B.S. M.S. Wildlife Management; Humboldt State University, 1983.

Forest Service: 2.5 years

Steven Kessler **Fish Biologist**

Contributions made:

Summarized fish habitat situation on the Tongass, including production coefficients.

Participated in the Development of the Forest-wide GIS database.

Managed public scoping database, and analyzed public comments.

Education:

B.S. Biological Sciences, University of Arizona, 1974.

M.S. Ecology and Evolutionary Biology, University of Arizona, 1978.

Forest Service: 9 years

Fish Biologist, Tongass NF, Tongass Forest Plan Revision Interdisciplinary Team, Juneau. 1987-present

Forest Fish Biologist, Wenatchee National Forest, 1983-1987.

Fish Biologist, Tongass National Forest, Chatham Area, Juneau Ranger District, Yakutat Work Center. 1980-82.

Fish Biologist, Tongass National Forest, Chatham Area SO, 1980.

Other Relevant Employment:

Planner, Alaska Department of Fish and Game, FRED Division (on IPA assignment from Forest Service to ADF&G), 1982.

Fish Technician, USDI, Bureau of Land Management, Boise, Idaho, Summer 1979.

Hydrology Technician, USDI Bureau of Land Management, Worland, Wyoming, Summer 1978.

Research and Teaching Assistant, University of Arizona, 1975-1978.

Instructor, Pima Community College, Tucson, AZ, 1977-79.

Donald C. Lyon

Forest Plan IDT Leader (1987-1/89)

Education
BS Forest Management, Washington State University, 1965

Forest Service

Forest Planning Staff
IDT Leader of a Forest Plan
Wilderness Study Coordinator
District Ranger
District Resource Assistant
District Timber Assistant

Charles E. McConnell

Recreation Planner

Contributions made:

-Coordinated and helped develop techniques for gathering and compiling the recreation resource inventory on the Forest.
-Helped to develop the system used for inventorying and analyzing eligible rivers for possible inclusion in the National Wild and Scenic Rivers System.
-Coordinated with Forest and Regional Office staff in developing the GIS database for the recreation resource.
-Coordinated with FSL and University of Minnesota to conduct the Southeast Alaska Pleasure Visitor Research Program used for economic impact analysis of tourism.

Education:

B.S. Forest Recreation, Colorado State University, 1957

Forest Service: 32 years

Regional Recreation Planner, Alaska Region (2 years)
Recreation and Wilderness Planning and Management, Rocky Mountain Region (7 years)
Winter Sports Specialist, Rocky Mountain Region (4 years)
Forest Planning Team Leader, Arapaho/Roosevelt NF's (1 year)
Forest Resource Staff Officer, Grand Mesa-Uncomphagre and Arapaho NF's (10+ years)
Recreation Forester, Black Hills NF, White River NF (8+ years)

Connie G. Myers **Public Affairs Specialist/Social Scientist**

Contributions made:

Public Involvement
Socio-economic Analysis
Writer/Editor

Education:

B.S. Natural Resources Management, University of Tennessee at Martin, 1981
M.S. Fisheries and Wildlife, Michigan State University, 1985
M.S. Communication, Michigan State University, 1985

Forest Service: 4 years

Public Affairs Specialist, Forest Plan Revision Team (2 years)
Social Scientist, Ketchikan Area (1 year)
Subsistence Specialist, Ketchikan Area (1 year)

Other Relevant Employment:

Fisheries and Wildlife Internship Coordinator, Michigan State University, 1981-1985
Teaching Assistant, University of Tennessee at Martin, 1980-1981
Park Technician, US Army Corps of Engineers, 1979-1980
Park Naturalist, Tennessee State Parks, 1978

Mark L. Orme **Wildlife Biologist**

Contributions made:

Coordinated and compiled wildlife habitat and population information for the Revision.
Coordinated the development of Research Natural Area and Experimental Forest proposals for the Revision.
Analysis of subsistence use.
Compiled the habitat and population information for threatened and endangered and sensitive species.

Education:

BS Forestry, University of Idaho, 1971
MS Wildlife Management, University of Idaho, 1975

Forest Service: 12 1/2 years

Wildlife Biologist, Region 10 - 2 years
Wildlife Biologist, Targhee National Forest - 6 years
Wildlife Biologist, Idaho Panhandle National Forest - 3 years
Forestry Technician, Clearwater National Forest - 1 year
Hydrologic Technician, Clearwater National Forest - 6 months

Other Relevant Employment:

Research Associate, Univ. of Idaho - 2 years
Biological Technician, Idaho Department of Fish and Game - 2 years

Rick Perkins **GIS Technician, Computer Assistant, JRD**

Contributions made:

ARC/INFO User, Data-Editing, AML-Programming

Bruce Rene — **Natural Resource Planner, Documents Coordinator**

Contributions made:

Provide guidance on and facilitate: 1) the documentation of the National Forest Management Act planning process, and 2) the analysis and documentation required by the National Environmental Policy Act.

Education:

B.A., Humanities, Shimer College 1967
M.A., English, University of Kentucky, 1970
MBA, Business Administration, University of Texas, 1976

Forest Service: 12 years

Documents Coordinator, six months
Assistant Forest Planner & Environmental Coordinator, Stanislaus N.F., 11 years

Lance H. Tyler — **Recreation Planner**

Contributions made:

Roadless Area Analysis
Wild & Scenic Rivers Analysis

Education:

B.A. International Relations (Asian Studies) 1967
M.S. Recreation Resources, Colorado State University, 1977

Forest Service: 12 years

Outdoor Recreation Planner, Arapaho and Roosevelt National Forests 12 years

Other Relevant Employment:

Supervised university contract for development of State Comprehensive Outdoor Recreation Plan (SCORP) for Colorado 1976
U.S. Department of State 1967-1975, Washington D.C., Taiwan, Hong Kong

Extended Team

Robert C. Aiken — **Transportation Planner**

Contributions made:
Coordinated transportation and facilities input, including log haul costs, future road density estimates, log transfer facility inventory, and facility needs.

Education:
B.S. Forest Engineering, Oregon State University, 1980.

Forest Service: 9 years
Transportation Planner, Tongass National Forest, Stikine Area, 1984-present
Forester, Siuslaw National Forest, 1980-84

Other relevant employment:
Cooperative Education Student, Siuslaw National Forest (2 years)
Forestry Aid, Siskiyou National Forest (2 seasons)

John T. Autrey — **Archaeologist**

Contributions made:
Cultural Resource Management

Education:
B.A. Anthropology, Univ. of Northern Colorado 1973.
M.A. Anthropology, Univ. of Northern Colorado 1973.

Forest Service: 7 years
1987-Present: Ketchikan Area, Tongass National Forest, R10, Area Archaeologist
1984-1987: Kaibab National Forest, R-3, Ass't. Forest Archaeologist
1982-1984: Chatham Area, Tongass National Forest, R10, Archaeological Technician.

Deirdre P. Buschmann

Landscape Architect

Contributions made:
Visual Resoure Analysis

Education:
Bachelor of Landscape Architecture (B.L.A.), University of Washington, 1980.

Forest Service: 8 1/2 years
Forest Landscape Architect, Tongass NF, Stikine Area July 1985 to Present
Landscape Architect, Tongass NF, Stikine Area, June 1981-June 1985
Engineering Draftsman, Tongass NF, Stikine Area, Feb 1981 - June 1981.

David M. Hatfield, Jr

Geologist

Contributions made:
Minerals Analysis

Education:
B.A. Geology/Outdoor Education, Evergreen State College, 1978.
M.S. Geology, Western Washington University, 1983.

Forest Service: 7 Years
Forest Geologist, Tongass National Forest, Ketchikan Area (1.5 years).
Geotechnical Engineer, Tongass National Forest, Ketchikan Area (3.5 years).
Engineering Geologist, Gifford Pinchot NF (2 years).

Other relevant employment:
Assistant Mineral Examiner, U.S. National Park Service (1 month)
Research Assistant, Western Washington University (8 months)
Coastal Geologist, Coastal Consultants Inc (9 months)
Resource Assessment Geologist, U.S. Bureau of Mines (4 months)
Soil Conservation Technician, U.S. Soil Conservation Service (4 months)

David Loggy

Soil Scientist
Certified Professional Soil Scientist since 1977.

Function on Revision Team:
Team member covering watershed and air resources

Contributions made:
Established watershed and air standard and guidelines.
Municipal Watershed prescription.
Established wetland identification, classification and delineation.
Watershed input into riparian prescriptions.
Watershed and air sections of AMS.

Education:
AA degree, Casper Junior College, 1961
B.S. Range Conservation, Colorado State University, 1966

Forest Service: 24 years
Soil Scientist, Tongass National Forest, Ketchikan Area (16 years)
Soil Scientist, San Juan National Forest, Supervisor's Office (7 years)
Range Technician, Wallowa-Whitman (1/2 year)
Range Aid, Medicine Bow National Forest, Thunder Basin National Grassland (1/2 year).

John Morrell

Lands Specialist, Law Enforcement Specialist

Contributions made:

Lands analysis

Education:

B.S. Forestry, University of Montana, Missoula, 1967
M.S. Forestry, California State University, Humboldt, 1976
Master of Forest Resources, University of Washington, 1977

Forest Service: 11 years +

Lands Forester, Tongass N.F., Chatham Area (4 years)
Resource Assistant, Thorne Bay R.D. (2 years)
Resource Assistant, North Prince of Wales R.D. (2 years)
Forester/Recreation Assistant, Packwood R.D. (2 years)
Forester, Packwood R.D. (1 year)
Forestry Technician, Packwood R.D. (3 months)

Other Relevant Employment:

Research Assistant, University of Washington/PNW Experiment Station (1.5 years)
Recreation Technician, BLM, Ukiah, CA (3 months)

Eugene (Gene) Wheeler

Forester. Represent State & Private Forestry on the IDT for Revision of the Tongass Land Management Plan

Contributions made:

Provided the Forest Wide S&G's and the Prescription S&G's for Fire Management and for Insect & Disease Management.

Education:

B.S. Forest Management, Washington State University, 1957

Forest Service: 33 years

Group Leader for Forest Management, Planning, & Utilization, Region 10 (11 years)
River Basin Planner, Region 6 (10 years)
Asst. Ranger, Chesnimnus RD, Wallowa Whitman NF (5 years)
Asst. Recreation Staff, Wallowa-Whitman NF (2 years)
Asst. Ranger, Judith Basin RD, Lewis & Clark NF (2 years)
TMA, Libby RD, Kootenai NF (3 years)

OTHER CONTRIBUTORS

Arnold J. Albrecht — **Regional Recreation, Wilderness and Trails Management Specialist**

Contributions made:

Coordinate the writing of the Draft Wilderness AMS

Education:

BS Forest Management, Humboldt State University, 1962
Forest Service Recreation Short Course, Clemson University, 1982

Forest Service: 27+ years

Recreation Staff, Regional Office, Juneau, AK. 3 1/2 years.
Forest Recreation Staff Officer, Chugach National Forest, Anchorage, AK, 12/80 to 3/86.
Special Land Uses Staff Officer, Lake Tahoe Basin Management Unit, South Lake Tahoe, CA., 11/78 to 12/80.
Recreation Officer, Mammoth Lakes, CA. 9/74 to 11/78.
Recreation and Resource Officer, Downieville Ranger District, Tahoe National Forest, Downieville, CA. 5/71 to 9/74.
Recreation Assistant, Pineridge Ranger District, Sierra National Forest, Big Creek, CA. 2/68 to 5/71.
Forester (GS460-5 thru 9), Hayfork Ranger District, Shasta-Trinity National Forest, Hayfork, CA. 6/64 to 9/67.
Forestry Aid/Technician Seasonal Employee on the Sequoia, Inyo, and Six Rivers National Forests from 1956 thru 1961.

Katherine C. Bowman | **Writer/Editor**

Contributions made:
Helped write the Summary.

Education:
A. S., Forestry Technology, Central Oregon Community College, 1975.
B. A., Interdisciplinary (Communications, Geography, Writing), Marylhurst Education Center, 1979.

Forest Service: 6 years
Forestry Technician, Siskiyou National Forest, 2 years, writer/editor.
Pacific Northwest Region and Pacific Northwest Research Station, 4 years.

Other Relevant Employment:
Free-lance newspaper correspondent, 4 years.

Paula Burgess | **Public Affairs Specialist**

Contributions made:
Helped write the Summary.

Education:
B. A., Language Studies, Humboldt State University, 1975.
M. A., Geography, University of Washington, 1978.

Forest Service Employment: 2 months
Public Affairs Office, Regional Office, Juneau, Alaska.

Other Relevant Employment:
Southeast Regional Manager for Alaska Department of Natural Resources.
Staff, Alaska State Senate Finance Committee.
Deputy Planning Director, Fairbanks North Star Borough.
Native Counselor, KCA, Kodiak, Alaska.
Teaching Assistant, Geography, University of Washington.

Tom Bobbe | **Forester**

Contributions made:

Contributed to the development of the GIS database for the Ketchikan Area. Coordinated the automation of the vegetation layer into GIS. Also coordinated the development of the timber operability inventory and automation into GIS.
Contributed to the development of the standards and guidelines for riparian management.

Education:

Bachelor of Science, Forestry, 1975
Master of Forestry, Forest Engineering, 1983

Forest Service: 15 years

Assistant to the Ketchikan Area Timber Staff Officer - 7 years
Logging Systems Specialist R6 RO - 2 years
Forester Stikine Area - 6 years

Janis Burns Buyarski | **Detailer for Wilderness ratings**

Contributions made:

Prepared narrative reports for wilderness ratings on the Stikine area.

Education:

B.S in Forestry, University of Illinois, Urbana campus, 1977

Forest Service Employment: 11 years

Planning Team Leader, Stikine Area, Tongass NF, (10 mos)
Management Systems Program Manager, Stikine Area, Tongass NF, (2 years)
Timber Sale Contract and Appraisal Specialist, Stikine Area, Tongass NF (2 years)
Pre-sale Forester, Wrangell RD, Stikine Area, Tongass NF (1 year)
Pre-sale Forester, Idaho City RD, Boise NF, (3 years)
Forestry Technician, Sault Ste Marie RD, Hiawatha NF, (2 years)

Other Relevant Employment:

Consulting Forester, self employed (18 months)

Linda Christian	**Recreation Forester**	

Contributions made:
Added and rewrote sections of the Draft Wilderness plans.

Education:
Humboldt State University, 1977, Forestry.

Forest Service:
Recreation Planner, in charge of trail maintenance, cabins, recreation sites and inventory of Wilderness Areas.

Other Relevant Employment:
Avid backpacker and kayaker, including travel in designated wilderness areas.

Cecilia C. Curtis — **Clerk-Typist III**

Contributions made:
Updating planning records.

Education:
High School Diploma, 1963.

Forest Service: 1 year.
Clerk-Typist, Management Services, Regional Office, Alaska Region

Other Relevant Employment:
Private sector legal assistant, 15 years.

Ronald R. Dippold **Oracle Specialist**

Education:

Rose-Hulman Institute of Technology, 3 years towards BS in Electrical Engineering and BS in computer science.
University of Alaska (1981-1985) 35 credit hours, Computer Science, Math, and English.

Forest Service: 1 year

Volunteer 1987 TLMP (3 months)
Volunteer Computer Specialist (3 months)

Other Employment:

President and owner - Computer Consulting Firm 1980-1989.
Computer Specialist, State of Alaska, ADF&G, and Legislative Affairs 1984-1988.

Maria S. Dudzak **Planning Assistant**

Education:

B.S. Geography, University of California, 1985.

Forest Service: 4 years

Planning Assistant, Regional Office, Alaska Region, Juneau, Alaska
Secretary to the Director, Forestry Sciences Laboratory, PNW Research Station, Juneau, Alaska (1 year)
Forest Guide, Regional Office, Alaska Region, Juneau, Alaska (2 years)

Other Relevant Employment:

Cartographic Technician, USDA Soil Conservation Service, 1985.
Geologic Aide, Bureau of Land Management, 1984.

Dick Estelle **Planning Staff Officer - Stikine Area**

Contributions made:

Assist in coordination of IDT activities with the Stikine Area Management Team

Assist IDT in formulating procedures and processes

Education:

B.S. Horticulture, Landscape Construction & Maintenance, Oregon State University, 1979.

Forest Service: 20 years

Planning Specialist, Stikine Area, Tongass NF (10 years)

Forest Landscape Architect, Stikine Area, Tongass NF (5 years)

Forest Landscape Architect, Kootenai NF (4 years)

Assistant Landscape Architect, Siuslaw NF (1 year)

Other Relevant Employment:

Grade School and High School Teacher - State of Alaska, 1965-66.

Theodore W. Falkner **GIS Coordinator, Chatham Area, Tongass NF**

Education:

Humboldt State, Forestry, 1956-60.

Humboldt State, Civil Engineering, 1960-62

LA State, Los Angeles, Civil Engineering, 1964-66,

Forest Service: 30 years

Transportation Planning, Small Data Base Design and Maintenance, GIS Coordination, Tongass NF 1982-Present.

Transporation Planner and Logging Engineer, Klamath NF 1970-1982.

Transportation Planner, Logging Engineer, Sequoia NF, 196-1970

Survey Technician, Design Engineer, Angeles NF 1962-1966.

Survey Technician, Klamath NF, 1958-1962.

Michael E. Fox

Planning Assistant, Chatham Area

Contributions made:

Prepared roadless area evaluations and Wild and Scenic River tentative eligibility determinations.

Education:

B. S., Forest Management, Utah State Univ.

Forest Service: 17 years

Tongass N.F., Chatham Area, Planning Asst. (1 year)
Malheur N.F., Forester, (9 years)
Klamath National Forest, Forester (2 years)
Kaibab N.F., Forester (2 years)
Deschutes N.F., Forestry Tech. (1 year)
Stanislaus N.F., Forestry Tech. (2 years)

Other Relevant Employment:

U.S.A.C.E., Ft. Worth Engineering District, Forester (3 years)

Ron Freeman

Forester; Support specialist on TLMP

Contributions made:

Writing and editing of roadless area evaluations; editing Wilderness AMS, Stikine Area

Education:

B.S. in Forestry , University of Washington, 1976

Forest Service Employment: 20 years

Recreation Staff, Stikine Area, Tongass NF (6 months)
Resources Forester, Randle Ranger District, Gifford Pinchot N.F. (9 years)
Forestry Technician, Oakridge Ranger District, Willamette N.F. (11 years)
Details to: Wenatchee N.F.(White Pass Ski Area EIS), Mount St. Helens National Volcanic Monument (Rec Staff), Hells Canyon NRA (Recreation Planning)

Other Relevant Employment:

Seasonal employment with National Park Service and Forest Service.

Charles R. Gass

Planning Staff Officer, Ketchikan Area, Tongass NF (Retired)

Education:

B.S. Soil Science, University of Tennessee, 1958
M.S. Soil Science, University of Tennessee, 1961

Forest Service: 28 years

Planning Staff, Tongass National Forest, Ketchikan Area (13 years);
Planning Team Leader, Ketchikan Area (5 years).
Soil Scientist, Ketchikan Area 7 years.
Soil Scientist, Daniel Boone NF, Ky (2 years)
Soil Scientist, Monongahela NF, W. Va. (1 year)

Other employment: Research Assistant University of Tennessee 1958-61.

Susan Gorder

Engineering Technician

Contributions made:

Database assistance.

Education:

A.A. - Engr. Technology, 1982

Forest Service: 3 years, Chatham Area, GIS

Other Relevant Employment:

State of Alaska, State Trooper

Geneen Granger | **Detailer for Roadless Areas, Wild and Scenic Rivers, Editing**

Contributions made:

Contributed to the writing, editing, and preparation for publication of Appendices C and E; edited other appendices and chapters of the DEIS.

Education:

B.A. Anthropology, University of California, Davis, 1973.
MLIS, University of California, Berkeley, 1987.

Forest Service: 1 year

Writer/Editor, Tongass NF, Ketchikan Area, April 1989 to present

Other Relevant Employment:

Research Librarian, University of California, Davis

Charlotte Greenfield | **Computer Programmer Analyst, GIS**

Contributions made:

Computer programming and analysis.

Forest Service: 12 years

GIS Computer Analyst, Stikine Area, Tongass N.F. (2 years)
Computer Programmer, Stikine Area, Tongass N.F. (6 years)
Draftsman, Planning, Stikine Area, Tongass N.F. (4 years)

Other Relevant Employment:

Title Searcher, Safeco Title Ins., Eugene, Oregon.

Ann Gross | **Business Management Clerk**

Contributions made:

Prepared tables in Office/Publisher

Forest Service Employment

Business Management Clerk, Petersburg Ranger District, 2 years.

Brad L. Hunter | **Recreation Forester**

Contributions made:
Wilderness narratives for Petersburg Ranger District

Education:
Purdue University, B.S. Forest Management, 1978

Forest Service: 12 years

Jane Hurst | **Computer Assistant**

Contributions made:
Office/Publisher production support.

Forest Service Employment: 8 years
Computer Assistant, Ketchikan Area

Annemarie LaPalme | **Forester**

Contributions made:
Updated AMS for West Chichagof/Yakobi and South Baranof Wildernesses.

Education:
B.S. Forest Management 1980

Forest Service: 10 years
Forester, Recreation, Sitka Ranger District, Chatham Area, Tongass National Forest, 1 year.

Willard D. Lowe

Resource Assistant, Wrangell Ranger District

Contributions made:

Rewrote sections of AMS for Stikine-LeConte Wilderness Area.

Education:

B.S. Forest Management, Washington State University, 1967.

Forest Service: 23 years:

Recreation, Wilderness, and Lands on the Wrangell Ranger District (9 years)

Resource Management Assistant (RMA) on Wrangell RMA unit of the Stikine Area (4 years)

Fifteen years experience in Region 10, thirteen of it on the Wrangell District/RMA Unit, participated in Original TLMP.

Other Relevant Employment:

Eight years experience in Region 1 on two forests, three districts, and an S.O.

Marti M. Marshall

Recreation Specialist/Planner

Education:

B.A. Multidisciplinary Social Sciences, Michigan State University, 1976

Forest Service Employment : 11 years

Recreation Specialist, Tongass National Forest, Chatham Area (2 years)

Recreation Technician, Tongass National Forest, Juneau Ranger District (2 years.)

Recreation Technician, Mt. Hood National Forest, Columbia Gorge Ranger District (7 years)

Jim Schramek **GIS Coordinator (Stikine Area)**

Education:
- B.S. Forestry, University of Minnesota, 1971.
- M.S. Forest Hydrology, University of Minnesota, 1977

Forest Service: 12 years
- GIS Coordinator, Stikine Area (2 years)
- Planner, Stikine Area (5 years)
- Hydrologist, Stikine Area (5 years)

John C. Sherrod **Planning Staff Officer, Chatham Area Management Team Representative**

Contributions made:
- Assist in coordination of IDT activities with the Chatham Area Management Team.

Education:
- B.S. Forestry, University of Georgia, 1960.
- M.S. Forest Resources, University of Idaho, 1980.

Forest Service: 27 years
- Planning Staff Officer on the Helena, Chugach, and Tongass National Forests (11 years)
- Planning Team Leader on the Custer, Gallatin, and Willamette National Forests (6 years)
- Ranger District assignments on four Districts on the Colville and Custer National Forests (10 years)

Tammy Skeens **Natural Resource Planner**

Contributions made:
GIS support and database support.'

Education:
B.S. Natural Resources Management, Colorado State University, 1983

Forest Service: 8.5 years
Natural Resource Planner- ID Team Leader, 2 months
Assistant GIS Coordinator- Stikine Area, 2 years

Other Relevant Employment:
One season YCC Bureau of Reclamation
One season YCC Youth Leader Bureau of Reclamation

Barbara A. Stanley **Recreation and Lands Forester, Ketchikan Ranger District**

Contributions made
Coordinated Wild and Scenic Rivers input for the Ketchikan Area. Prepared river descriptions and maps for Appendix E.

Education
B. Music, Keyboard Performance, 1970
M.S. in Natural Resource Management, 1973

Forest Service: 9 years
Recreation and Lands Forester; developed recreation, special uses, and lands, 3 years
Forestry Technician in Rec and Lands
Recreation Planner, Arapaho and Roosevelt NF; Recreation Research Technician, Southeastern Forest Experiment Station.

Other Relevant Employment.
Recreation Research Technician, Purdue University/Indiana Department of Natural Resources. Planned statewide trail system and evaluated streams for potential inclusion in National Wild and Scenic River System.

James M. Thomas

Supervisory Computer Programmer Analyst

Contributions made:

Prepared Roadless Area evaluations for the Chatham Area.
Provided Computer and Telecommunications support.

Education:

B.A. Environmental Biology, University of Colorado, 1974
Graduate Studies in Geology, Western State College, 1979
Graduate Studies in Forestry, Resource Planning, Recreation Management, Colorado State University, 1981

Forest Service Employment: 11 years

Supervisory Computer Programer Analyst
- Tongass National Forest, Chatham Area (3 years)
- Arapaho and Roosevelt National Forest (2 years)

Operations Research Analyst, Shawnee National Forest (3 years)
Natural Resource Planner, White River National Forest (1 year)
Forest Technician, (Part Time for 5 years)
- Arapaho and Roosevelt National Forest
- San Juan National Forest
- White River National Forest

Bill Wilson

Timber Planner (1987-5/89)

Contributions made:

Timber analysis.

Education:

B.S. Forestry, McNeese State University, 1968

Forest Service: 22 Years

Revision IDT Member, Tongass National Forest, (1987-Present)
Regional Office Timber Planner, Alaska Region, (7 years)
District and Supervisors Office Timber Assistant, Lincoln N.F. (3 years)
District Timber Assistant, Kiabab N.F., (1 year)
Supervisors Office Timber Assistant, Prescott N.F. (4 years)
Inventory Forester, Southern Forest Experiment Station, (3 years)
Forestry Aid, Mt. Hood N.F., (1 year)

Elsan Zimmerly **Writer/Editor**

Contributions made:
Writer/Editor, Socioeconomic Overview

Education:
B.S. Forest Recreation, Colorado State University, 1984.
Country School of Photography, Vermont

Forest Service: 4 years
Naturalist (2 years)
Photographic Coordinator; Begich, Boggs Visitor Center
Portage, Alaska
Writer/Photographer, 2 years

Other Employment:
Instructor of Photography, Experiential Learning Program, Colorado State University (6 years)

CHAPTER 5

AGENCIES, ORGANIZATIONS AND INDIVIDUALS RECEIVING COPIES OF THE DOCUMENTS

CHAPTER 5

AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING COPIES OF THE DOCUMENTS

Note: Chapter 5 is in two parts, each with a section for agencies, organizations, and individuals. The first part lists receivers of the full set of DEIS documents. The second, those receiving only the Summary.

AGENCIES TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT

Admiralty Monument
Agriculture Stabilization & Cons.
AK Commerce & Economic Devel.
    Gerry Engel
    Craig Lindh
AK Dept. of Environmental Conserv.
    Amy Kruse
    Richard Stokes
    Dave Sturdevant
AK Department of Natural Resources
    Drew Grant
    Dee Koester
    Jim McAllister
    Nan Musslewhite
    Andy Pekovich
    Elizaveta Shadura
AK Department of Transportation
    Edward Dierick
    Morton Cook
AK Public Lands Information Center
Alaska Delegation
    Special Assistant
    Staff Assistants
Alaska Department of Fish and Game
    David A. Anderson
    Robert Bosworth
    Don Cornelius
    Rod Flynn
    Gary Gunstrom
    Jack Gustafson
    Dave Hardy
    Matt Kirchoff
    Janet Hall Schempf
    Robert F. Schroeder, PhD
    Mark Schwan
    Brad Sele
    Lana Shea
    Michael Thomas
Alaska Department of Labor
Alaska Land Use Council
    Bill Allen
    Asst. Regional Administrator
    Gail Baker
    James Barkley, Esq.
    Jay Bergstrand
    Sal DeLeonardis
    Bartz Englishoe
Alaska Land Use Council
    Boyd Evison
    Executive Director
    Ned Farquhar
    Dr. Hugh B. Fate, Jr.
    Sally Gilbert
    Sharon Jean
    Larry Kimball
    Richard Knapp
    Ron McCoy
    Barry Moorhead
    Steve Moreno
    Ron Morris
    Vernon R. Olson
    Debra Oylear
    Lt. Cmd. Robert Pawlowski
    Wayne Ross
    William Ross
    Dr. Lidia L. Selkregg
    Walt Sheridan
    Stephen F. Sorenson
    James F. Stratton
    Vernon R. Wigging
    E.I. (Bill) Williams
    Esther Wunnicke
Alaska Public Affairs Journal
Alaska Public Lands Info Center
Alaska Senator John B. Coghill
Alaska State
    John Katz
    Eric Laschever
    Richard A. Neve
    Frank Seymour
Anchorage Chamber
Anchorage Municipality
Bureau of Governmental Coord.
Bureau of Indian Affairs
Bureau of Land Management
    Chief
    Dennis Nielsen
    State Director
Citizen Advisory Commission
City and Borough Juneau
City and Borough of Sitka
City of Angoon
City of Craig
City of Homer
City of Hoonah
City of Juneau
City of Ketchikan
City of Pelican
    Harry A. Davidson
    Bill Odell
City of Petersburg
City of Port Alexander
City of Tenakee Springs
City of Thorne Bay
City of Wasilla
City of Whittier
Community Education
Congressional Rural Caucus
    Greg Hodur
    Jack Pollard
Department of Natural Resources
Dept. of Commerce, NOAA
Dept. of Health & Human Services
Division of Planning & Policy
Environmental Protection Agency
Farmers Home Administration
House Agriculture Committee
    Tim Decoster
    Jim Lyons
House Appropriations Committee
    Robert Foster
    Kathleen Johnson
House Governmental Operations
House Interior & Insular Affairs
House Merchant Marine & Fisheries
House Science & Technology
National Center
National Marine Fisheries Service
National Park Service
    Glenn O. Clark
    Marvin Jensen
    Richard H. Martin
    Janet McCabe
    Rick Mossman
    Dennis Schramm
    Mark T. Schroeder
National Parks & Conservation Ass.
Office of Regional Econ.
Pacific Northwest Reseach
Pioneer National Forest
PNW Experiment Station

AGENCIES TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT (Cont.)

Public Affairs
Regional Environmental Officer/DOI
San Bernardino National Forest
Senate Agriculture Nut & Forestry
- Chris Coffin
- David Voight

Senate Appropriations
Senate Energy & Natural Resources
- Beth Norcross
- Tom Williams

Senator Frank H. Murkowski
- Gregg Renkes

Senator Ted Stevens
- Alaska Office

Senator Ted Stevens (Cont.)
- Svend Brandt-Erichsen

Southeastern Forest Exp. Station
State Division of Forestry
US Army Corps of Engineers
US Bureau of Mines
US Department of Energy
US Department of the Interior
US Dept Housing & Urban Develop.
US Fish and Wildlife Service
- Ronald L. Garrett
- Conrad Guenther
- Walter O. Stieglitz

US Geological Survey
US Representative Donald E. Young
- , Daniel V. Kish

US Small Business Administration
USDA Forest Service
- James C. Cochrane
- Andrea Hille
- Dwynne Kromarek
- Wayne R. Nicolls
- James D. Rhodes
- Tony Rodarte
- Don L. Stewart
- William R. Tremblay

ORGANIZATIONS TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT

A. Holmes Johnson Memorial Library
AAWPA Local 783
AERG
Afognak Native Corporation
Alaska Federation of Natives
Alaska League of Women Voters
Alaska Loggers Association
- James Clark
- Don L. Finney
- Kirsten Held
- Thyes J. Shaub

Alaska Lumber & Pulp Company
Alaska Miners Association
Alaska Miners - CHMM F/O
Alaska Native Foundation
Alaska Native Sisterhood
Alaska Pacific University
Alaska Pulp Corporation
- Kenneth J. Hammons
- Edward Oetken
- Rollo Pool
- Franklin R. Roppel
- Atsuo Tsunoda
- George Woodbury

Alaska Resources Library, USDI
Alaska River & Ski Tours
Alaska State Chamber of Commerce
Alaska State Library
- Patiere Fredireksen

Alaska Timber Corporation
Alaska Troller's Association
- Earl Krygier, Director
- Walter Pasternak

The Alaska Wildlife Alliance
Alaska Women in Timber
- Jackie Durette, Director
- Helen Finney
- JoAnn Venneberg

Aleut Corporation
Alpine Lakes Protection Society
American Forestry Association
- Neil Sampson
- Zane Smith

American Rivers
Anchor Pt. Public Library
Anchorage Chamber of Commerce
Anchorage Municipal Libraries
Angoon Advisory Committee
Angoon Fish and Game
Angoon Public Schools Library
Arctic Environ. Info & Data Center
Aristarchus Group
ARRM
Eric Twelker, Attorney At Law
Auburn University
Baranof Wilderness Lodge
Baxter School Library
Bering Straits Native Corporation
Bogle & Gates
Boise State University
Bristol Bay Native Association
Bristol Bay Native Corporation
Brooks Range Library
Buffer Zoners
Bureau of Land Management
C & F Logging Company
- Dan Camper
- Edward C. Oliver

California Polytech, State Univ.
Cape Fox Corporation
Central Council of Tlingit & Haida
Chec - Forest Watch
Chilkoot Indian Association
Chilkoot Lumber Company, Inc.
Citizen's Advisory Committee
Clackamas Community College
Clarke, Logan & Yound
Clemson University
Coeur d'Alene Mines Corporation
Colorado State University
Copper Queen Library
Cordova Chamber of Commerce
Cornell University
Craig Advisory Committee
- Duane James
- Greg Shapley

Craig Public Library
Forest Dewitt
Douglas Public Library
Earth First!
- George Draffan
- Mitch Freedman
- Lauren E. Rogers

Eastern Oregon State College
Edna Bay Advisory Committee
- Bert Begman
- Barbara Ganong

Eklutna, Inc.
Elfin Cove Advisory Committee
- Al Blair
- Jim Wild

Elmendorf Wildlife Museum
Environmental Protection Agency
The Evergreen State College
The Eyak Corporation
Fairbanks North Star Borough SD
Fairbanks Public Library
False Island - Kook Lake Council
Fishermen's Association
Fishing Vessel Owners Association
Friends of Berners Bay
Friends of the Earth
FS Timber Purchasers Council
Gastineau Channel Advisory Comm.
- B.W. Finley
- Bob Rausch

Glacier Guides, Inc.
Goldbelt, Inc
- Rich Dwyer
- Joseph Wilson

Grand Camp, ANB
Greens Creek Mining Co
Gustavus Public Library
Haines Borough Public Library
Hammon-Jensen-Wallen & Assoc.
Hansen Engineering
Harvey Mudd College
Hipp Engineering, Ltd.
Hokkaido University

Hollis Library Council
Homer Public Library
Hoonah Advisory Comittee
  Al Dick
  Al Hill
  Gordon Pederson
Hoonah Indian Association
  Wanda Culp
  Frank See, Sr.
Hoonah Public School
Hoonah Public School Library
Humboldt State University
Huna Totem Corporation
  James Austin, President
  Frank D. Williams
Hydaburg Advisory Committee
Hyder Advisory Committee
  Jim Bunn
  Dave Doyle
Hyder Public Library
Intn'l Association of F&WL Age
Iowa State University
Irene Ingle Public Library
Juneau Chamber of Commerce
Juneau Empire
Juneau Memorial Library
  Barbara G. Berg
Kake Advisory Committee
  Lonnie Anderson
  Henrich Kadake
Kake Tribal Corporation
  Clarence Jackson
  Gordon Jackson
Kavilco, Inc.
Kenai Community Library
Kenai Peninsula Comm. College
Ketchikan Fisheries Advisory Board
Ketchikan Advisory Committee
Ketchikan Chamber of Commerce
  Leslie Barthomew
Ketchikan Commercial Fishing Assoc
Ketchikan Community College
Ketchikan Community College Library
Ketchikan Air Service, Inc.
Ketchikan Indian Corporation
Ketchikan Public Library
Ketchikan Pulp Company
  Owen Graham
  Martin Pihl
  R.M. Ziesak
Kettleson Memorial Library
Kimshan Corporation
Klawock Advisory Committee
  Harlan Buoy
  Ernest Smith, Sr.
Klawock Heenya Corp.
  Reynolds Skan, Sr., Pres.
Klawock Public Library
Klukwan Advisory Committee
Klukwan, Inc.
  Ralph Strong
  William A. Thomas, Jr.
Klukwan IRA
Kodiak Chamber of Commerce
Kodiak High School Library
Koncor Forest Products
Kootznoowoo, Inc.
Labouchere Bay Community Club
League of Women Voters
The Library Canadian F.S.
Library of Congress
Louisiana State University
Louisiana Tech University
  Professor J. Edwin Carothers
  Ray A. Newbold, Assoc. Professor
  J. Lamar Teate, Director
Magill Trailer Park
Mason, Bruce & Girard, Inc.
McDowell Group
Jim McGowan, Attorney At Law
Mendenhall Valley Public Library
Metlakatla Community Library
Metlakatla Indian Community
Michigan State University
  Dr. Daniel E. Chappelle
  Eckhart Dersch
  Larry A. Leffers
Mississippi State University
Mississippi Valley State University
Mitkof Lumber Co., Inc.
Modesto Junior College
Moose Pass Public Library
Mountain States Legal Foundation
The Mountaineers
Mud Bay Logging
NANA Corporation
National Audubon Society
  David R. Cline
National Inholders Association
National Resource Committee
National Wildlife Federation
National Wildlife Society
Natural Resources Defense Council
Neighborhood Ecology Association
Ninilchik Native Association, Inc.
Noranda Exploration Inc.
North Carolina State University
Northern Arizona University
Northern Timber Corporation
Northwestern University
Ohio State University
Oklahoma State University
Opinionated Citizens Association
Oregon State University
  Harbans S. Chona
Organized Village of Kake
  Gary E. Wiliams, Adminis.
Organized Village of Saxman
Oxford Forestry Institute Library
Pacific Legal Foundation
Pacific University
Pelican Advisory Committee
  Carl Carlson
  Donald Nash
Pelican Public Library
Pelican Seafoods
Pennsylvania State University
Petersburg Advisory Committee
  Loren Croxton
  Aril Mathisen
Petersburg Chamber of Commerce
Petersburg Conservation Society
Petersburg Indian Association
Petersburg Public Library
Petersburg Vessel Owners Assn.
Pittsburg State University
Port Alexander Advisory Committee
  Jim Kornoelje
  Dennis Longstreth
Port Protection Community Assn.
Allyson Porter
Prince of Wales Dental Clinic
Public Awareness Committee, Inc.
R H Whelan Co.
Rain Forest Alliance
Reed College
Ivan E. Rezek, OEDP Chairman
Rocky Mountain Forest & Range Exp
Rogue Community College
Royal Highway Tours
Ryan Junior High School Library
Saint Martin's College
Robert Sanderson
Savannah State College
School of Forest Resources
School of Natural Resources
SE AK Seine Boat Owners & Ops Asso
SE Alaska Conservation Council
  Steve Kallick
  Bart Koehler
  Julie Koehler
  Joe Mehrkens
  John Sisk
SE Alaska Tourism Council
  J. Allan MacKinnon
  Jeff Slosh
SE Gillnetters Association
Sealaska Corporation
  Arlene Dilts
  Rick Harris
  Ervin Hillman
  William Howe, President
  Robert W. Loescher
  Bryan I. Mallott
  Richard Stitt
Seattle Chamber of Commerce
Seldovia Public Library

ORGANIZATIONS TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT (Cont.)

Selex Corporation
Seward Chamber of Commerce
Shaan-Seet, Inc.
Ester Shea, Tongass Tribe
Sheeatika, Inc.
Sheldon Jackson College
Sheldon Jackson Library
Shenandoah College
Sierra Club Legal Defense Fund
Sierra Club, Juneau Group
Sierra Legal Defense Fund
Silver Bay Logging, Inc.
 Dick Buhler
Silver Star Mining Co.
Sitka Advisory Committee
Sitka Chamber of Commerce
 Dick Griffin
Sitka Conservation Society
 Richard Nelson
Sitka Sound Seafoods, Inc.
Sitka State Parks Advisory Board
Skagua Traditional Village Council
Skagway Chamber of Commerce
Skagway Public Library
Professor Henry Wilds Smith, Jr.
Society of American Foresters
Soderberg Logging & Construction
 K.A. Soderberg
 Pat Soderberg
Southcentral Timber Development
Southeast Conference
Southeast Seiners Association
Southern Illinois University
Southern Southeast Reg Aquaculture
Southwest Oregon Community College
Stanford University
State University - ESF
State University of New York
Stephen Austin State University
Strategic Studies, Inc.
Sumner Strait Advisory Committee
 Ms. Gretchen Goldstein
 Chuck Piedra
Tanana Valley Community College
J.P. Tangen, Attorney At Law
Tatitlek Corporation
Temsco Airlines, Inc.
Tenakee Advisory Committee
Tenakee Springs Public Library
Texas A&M University
 Robert D. Baker
 J. Charles Lee
 J. Sonnenfeld
Thorne Bay Community Library
Timber Industry - APC
Tlingit-Haida Central Council
Tlingit-Haida Indians of Anchorage
Tongass Conservation Society
 Thomas L. and Marylyn Conley
 Allis May Davis
Tongass Sportfishing Assoc.
Treasure Valley Community College
The Trumpeter Swan Society
United Fishermen of Alaska
United Four Wheel Drive Assoc.
United SE Alaska Gillnetters
 Geron Bruce
University of Alabama
University of Alaska
 Dr. James V. Drew
 Tom Gallagher
 Tony Gasbarro
 Property Mgmt Specialist
 Aeden Roolins
 Bob Weeden
University of B.C. (Forestry)
University of California
 Richard A. Cooley
 John Loomis
 JoEllen Ryan
 Paul Zinke
University of Fairbanks
University of Georgia
University of Idaho
University of Idaho
University of Maine
University of Massachusetts
University of Minnesota
 Paul Ellefson
 Phillip Spleet
University of Missouri
Univerity of Montana
 Jean Parodi
University of Nevada
University of New Hampshire
University of Oregon
University of Portland
University of Reno
University of Santa Clara
University of Tennessee
University of Vermont
University of Washington
 Lisa Daber
 Brad Hanson
 Robert G. Lee
 Sharon Palge
 Andrew F. Johnson, Librarian
 Dr. Thomas R. Waggener
University of Wisconsin
Upper Lynn Canal Advisory Comm.
 Bob Becker
 Carmen Defranco
US Department of Agriculture
US EPA Alaska Operations Office
Utah State University
Valdez Chamber of Commerce
Visayas State College of Ag
Washington Native Plant Society
Washington State
Washington State University
West Virginia University
 Jack Coster
Western Forest Industries Assoc.
Western Mining Council
Westgold
Weyerhaeuser Company
Whitestone Logging, Inc.
 Darwin Pier
 Edward Stewart
 Keith Walker
 David Wright
The Wilderness Society
 Peter Kirby
 Deanne Kloepfer
Willamette University
Wrangell Advisory Committee
Wrangell Chamber of Commerce
Wrangell Public Library
Wrangell Sentinel
Yak-tat-Kwan, Inc.
 Lowell S. Peterson, Pres.
Yakutat Advisory Committee, Chair
Yakutat City Schools Library
Yakutat Fishermen's Association
Yakutat Lodge
Yakutat Native Association
Yale School of Forestry

INDIVIDUALS TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT

Kim Zieger-Aarthun
Douglas Aberley
James D. Allaway
Richard & Kay Andrew
Michelle Anthony
Blaise Apshago
Margaret Arend
Sandra Barclay
Elton Barnes
Russ Bartell
Angela Bautista
M. Ashton Berdine
Suzanne Berry
Robert Berryhill
Robert R. Bloye
Sam Booher
Nevette Bowen
Peter Branson
Phil Briggs
Mr. and Mrs. Albert C. Browne
Stewart Buchanan
Paul Burns
John F. Butkis
Don Carpenter

INDIVIDUALS TO WHOM THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT (Cont.)

Kathleen Castelein
Marshall Casteel
Claudia J. Christner
Kathryn Cieszynski
Debbie Colston
Pat Costello
George Craig
Ruth & John C. Crouse
E. Allen Crozer
Stuart Currier
Sam Cushman
John E. Dapcevich
Dave C. DeClue
Frank G. Delfino
Kevin Denver
Jim DiGennaro
Kenneth Bierly
Craig Duncan
James G. Dye
Jodie Marie Eash
Cheryl Ann Easterwood
Larry Edwards
Roger K. Eichman
Joe Enright
Prof. H.E. Evans
Tom Even
R. Christopher Feldman
Peter Frantz
Ron Garner
Blaine Garrett
Franklin L. Gearhart
Verna V. Gehring
John D. Gioia, Jr.
Berry Glover
Sydna Gordon
Philip & Carol Gray
Mikel R. Haase
Robert T. Haggard
Bob Hakala
David Hall
J. E. Hall Schempf
Barth T. Hamberg
Richard H. Hamilton, M.D.
Howard C. Hayes
Merritt Helfferich
Donna M. Hollingsworth
Peter M. Huberth
Michael Jackson
Tom Jacobson
Daryl James
Caroline W. Johnson
Patricia & Eric Jones
Jay Eric Jones
Ruby L. Keller
Mike Kirschner
Rebecca Knight
Kyle Landskroener
Deborah Leach
Doris Leibfreid
Donald C. Lyon
Mary MacIntyre
Bob Major
Brian Massey
Tyler Matlock
Donald W. McConachie
Kelly McCracken
Stephen Alan McDowell
Sarah McElroy
Jim McFarland
David McFadden
Authur Kevin McGrath
Antoinette R. McIntosh
Charles E. McLeod, Sr.
Karen McMains
Roger & Caroline Staples
Ted Merrell
Lou Merzario
Les Miller
Charles M. Mobley
John P. Monagle
Thomas Moore
Mr. and Mrs. C.R. Morttson
Conrad Muller
Dick Myren
Dave and Lauren Naslund
Richard K. Nelson
Kristen C. Newberg
Michael Nortz
Sean T. O'Brien
John Olson
Marcus Olson
Chris Pace
Jim Page
John Palmes
Jack Parrish
Jeffrey A. Rain
George Ramas
John C. Raynor
Dr. Robert R. Reppy
Michael S. Rhodes
Peter Rice
J.T. Rodewaid
Scott Russell
William H. Ruth
Ali N. Safyurtlu
Andrew Sarhanis
Alice D. Schrank
Richard Schroeder
Pamela R. Serafin
Theresa R. Shapiro
John C. Sherrod
Linn Shipley
Sandra Silveira
Sean G. Simmons
Roger D. Snippen
Patricia and Richard Sonnicksen
Roland & Alaire Stanton
William G. Stroud
Bryan Stutzki
Zoltan Szabo
Beverly Tatman
Gordon S. Thompson
Gary H. Townsend
Mark A. Trautman
Kim Turley
Joel Van Dam
Carol Vaught
Ken Vaughan
Tim Volwiler
Jeff Wachelka
Donald J. Walsh
Michael Welsh
Ron Welsh
John J. Williams
William Williamson
Bruce Winton
Robert Wolf
Doug and Jenine Wondrasek
Ron Wood
Walter M. Wood
Ben Worthington
Graham J. Wright
Ray Yarrow

AGENCIES TO WHOM A SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT

AK Commerce & Econ. Develop.
  Larry Merculieff
AK Department of Natural Resources
  Judy Brady
  Paula Burgett
  Carmen Denny
  Chas Dense
  Mike Eberhardt
  Executive Director
  Lennie Gorsuch
  Winston M. Laughlin
  Mike Lee
  Bob Merry
  Dick Mylins
  Terry Rader
  Regional Forester
  Mar Winega
  Leila Wise
AK Department of Transportation
  William Ballard
  Environmental Coordinator
  Dick Hamilton
  Mark Hickey
  Andy Hughes
  Robert A. Kase
  Dale R. Kubik
  Ray Meketa
  Ricardo T. Quiroz
  J.W. Scribner
  Elizabeth Selfridge
AK Dept. of Environmental Conserv.
  Dennis Kelso
  Chris Kent
  Dan Lawn
  William Leitch
  Public Affairs Officer
  Richard Reynolds
AK Div of Lands & Water Management
  Commissioner
  Gilbert Eakins
AK Division of Parks & Outdoor Rec
AK State ASCS Office
Alaska Biological Research
Alaska Board of Fisheries
  Bix Bonney
  Joe Demmert, Jr.
  Gary Slaven
Alaska Board of Game
  Joel Bennett
  Sidney Huntington
  Nick Jackson
  Brenda Johnson
  Jay Massey
  Sarah Scanlan
  Victor VanBallenberghe
Alaska Department of Education
  Will Demmert
  Terry A. Whitbeck
Alaska Department of Fish and Game
  Advisory Council Secretary
  Bruce Baker
  Gregory Box
  Don Collinsworth
  Tina Cunning
  Donald Diedelman
  Sterline Eide
  Steve Elliott
  J. Scott Grundy
  Harold Heinkel
  Dennis Huburtt
  Jeffrey Hughes
  Bob Johnson
  Loyal Johnson
  Don Kelly
  John Matthews
  Don McKnight
  Robert Mecum
  Sterling Miller
  Paul Novak
  John Schoen
  Roland Shanks
  Marilyn Sigman
  Chris Smith
  Nancy Tankersley
  Greg Thomason
  Frank VanHullie
  Carl Yanagawa
  David Zimmerman
Alaska Div. of Governmental Coord.
  Patty Bielawski
  Robert L. Grogan
  Daniel MacPherson
  Diane Mayer
Alaska Division of Forestry
  Bill Hansen
  Marc Lee
Alaska Division of State Parks
Alaska Environmental Lobby
Alaska Information Service
Alaska Legal Service Corp.
Alaska Marine Highway
Alaska Power Authority
Alaska Senator Lloyd Jones
Alaska State
  Judith Bittner
  Governor Steve Cooper
  Paul Maki
Alaska State Advisory Council
Alaska State Chamber of Commerce
  Shane Johnson
Alaska State Museum
Anchorage Forestry Science Lab
BC Ministry of Forests
Bureau of Indian Affairs
  Michael W. LeBrun
  Ken Maas
Bureau of Indian Affairs (Cont.)
  Frank L. Madison
  Steven R. Price
  Robert Sassman
Bureau of Land Management
Chattahoochee-Oconee NF
Chippewa National Forest
Cibola National Forest
City of Seward
City/Borough of Juneau
Clearwater National Forest
Cleveland National Forest
Coconino National Forest
Department of Commerce
Dept of Comm. & Regional Affairs
Div. of Land & Water Management
Division of Business Development
Division of Legislater Audit
Division of Mineral Development
Environmental Protection Agency
  Director
  Paul Kaldjian
  Ron Kriezenbeck
  Jerry Opatz
  K. Smart
Environmental Science & Engineer
Green Mountain National Forest
Haines Area
Hiawatha National Forest
Huron-Manistee National Forest
Inyo National Forest
Ketchikan Gateway Borough
Lassen National Forest
Lewis & Clark National Forest
Modoc National Forest
Monongahela National Forest
Mt. Hood National Forest
National Governors' Association
National Marine Fisheries Service
  John Hamilton
  Robert McVey
  Ted F. Meyers
  Michael Murphy
  Chuck O'Clair
  Bill Simpson
  William A. Smoker
  George Snyder
National Recreation & Park Assoc
Nicholet National Forest
Ouachita National Forest
Pike & San Isabel National Forest
Bonnie Potter, LIO
Prescott National Forest
Resource Analysts
Sawtooth National Forest
SE Regional Fish and Game Council
Senate Energy & Natural Resources
Seward Ranger District

AGENCIES TO WHOM THE SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT (Cont.)

Peggy Simons, LIO
Sitka National Historical Park
Sitka State Park and Recreation
Siuslaw National Forest
Sumter National Forest
Superior National Forest
Targhee National Forest
US Army Corps of Engineers
- Larry L. Reeder
- Gordon J. Severson

US Department of Interior
- Public Information Officer

US Fish and Wildlife Service
- Christian P. Dau
- Nevin Holmbert
- Marc Horton
- Bill Hughes
- Michael Jacobson
- Leslie Kerr
- Sue Matthews
- L. Scott McLean
- Wayne Oien
- David Patterson
- Project Leader

US Fish and Wildlife Service (Cont.)
- Public Affairs
- Stephen Wilson

US Geological Survey
- David A. Brew
- Max Brewer
- Dave Brewybeck
- Paul D. Brooks
- Donald Grybeck
- Mark B. Shasby

US Internal Revenue Service
USCG Readiness and Reserve
USDA Forest Service
- Regions 1-10
- Larry S. Born
- Ed and Janis Burns Buyarski
- Bruce Campbell
- Greg Clark
- Mark Clark
- Greg Clevenger
- Joe Doerr
- Arlene Doyle
- John Edgington
- Editor, Office of Information

USDA Forest Service (Cont.)
- Edward J. Fischer
- Don Flora
- Ed Gross
- Dan Logan
- Marcus Petty
- Daniel A. Wagner
- Michael C. White
- Carl Wilhelm
- W. Williamson
- Cat Woods
- Ms. Virginia Worthington

USDI Bureau of Indian Affairs
USDI Bureau of Mines
- Donald P. Blasko
- Jim Caldwell
- Dave Carnes
- Martin D. Conyac
- Tom Pittman

Washington Environmental Council
Washington Dept. of Wildlife
Wrangell-St Elias National Park

ORGANIZATIONS TO WHOM THE SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT

Joe Ambrose
Admiralty Alaska Gold Mining Co.
Adventuring in Alaska
AEIDC
Air Alaska
AK Chichigof Mining Company
Alascom, Inc.
Alaska Airlines Magazine
Alaska Angler
Alaska Aquaculture, Inc.
Alaska Biological Research
Alaska Board of Fisheries
- Val Angasan
- Ernie Carter
- Jesse Foster

Alaska Business Monthly
Alaska Chichagof Mining Co.
Alaska Construction & Oil
Alaska Discovery
Alaska Empire Gold Mining Co. Inc.
The Alaska Fisherman's Journal
The Alaska Geographic Society
Alaska Helicopters, Inc.
Alaska Iron Company
Alaska Magazine
- Robert Henning, Editor
- Jim Rearden, Outdoors Editor

Alaska Miners Association
- Robert Dotson
- Ken Eichner
- Richard A. Hughes
- Curtis V. McVee
- Ray Renshaw

Alaska Mining Association
Alaska Outdoors
Alaska Power & Telephone
Alaska Prospectors Society
Alaska Public Radio
Alaska Pulp Corporation
Alaska Radio Network
Alaska Sea Kayaking
Alaska Television Network
Alaska Women in Timber
- Pat Rowland, President
- Sally Coady

Alaska Wyldwind Charters
Alaskan Update
All Alaska Weekly
Alyeska Travel & Rec. Club
Alyu Mining Corporation
AMAX Mineral Resources Co.
American Fisheries Society
American Forest Council
American Forestry Association
American Forests Magazine
American Institute of Fishery
American Mining Congress
American Press Syndicate
American Wilderness Alliance
AMOCO Minerals Company
Anaconda Minerals Company
Anch. Convention & Visitors Bureau
The Anchorage Daily News
The Anchorage Times
- E. Piper
- John Quinley
- Bill Sherwonit

Andromeda Resources, Inc.
Apex El Nido Gold mines
Arctic Slope Regional Corporation
Ashby Jones Mining
Associate Editor
Associated General Contractors
Associated Press
- Sue Cross
- David Foster

AT&T Communications
Audubon Society
B & D Lab
Barrow Cable TV
Bering Straits Agluktuk
Bethel Cablevision
Kim and Sue Betzina
Biotechnology News
Bloom Logging Company
The Boat Broker
Bokan Mining Inc.
Bon Tara Mine
Borough Post
Boy Scouts - Troop # 53
Bristol Bay News
Bristol Bay Times
William Brock & Associates
Buse Timber & Sales, Inc.
California State University
- Dr. Jon K. Hooper
- C.M. Smallwood

The Capital City Weekly
Capital Information
Cascade Culvert Corporation
Chilkat Valley News
Chugiak-Eagle River Star

ORGANIZATIONS TO WHOM THE SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT WAS SENT (Cont.)

Citizen's Advisory Commission
Clark College
Clearwater Seafoods
Clemson University
Coastal Machinery
Colorado School of Mining
Colorado State University
Cominco American
Cook Inlet Aquaculture Corporation
Cook Inlet Fisherman Fund
Cooke Cablevision
Copper Valley Views
Cordova Cablevision
Cordova Times
Costeau Society
Craig Advisory Committee
Cultural Dynamics Ltd.
Daily Journal of Commerce
Daily Sitka Sentinel
Dave's Dream Mining Claims
Delta Paper
Michael P. Dixon, Attorney At Law
Eastern Washington University
Echo Bay Mines
Edna Bay Advisory Committee
    Judy Slatery
    Michael F. Tolson
    Georgia Williams
Environmental Defense Fund
Environmental Policy Institute
Envirosphere Company
Fairbanks Daily News
Fairbanks Daily News-Miner
Federal Aviation Administration
Fibrex & Shipping Co., Inc.
Fisheries, Fed. Assistance
Fishing & Flying
Mr. Otto Florschutz, III
Forest Service Monitor
The Forestry Forum
Friends of the Redwoods
Friends of the Snohomish River
Garnett Wood Products
Gastineau Channel Advisory Comm.
    Ole Bartness
    Harry Keller
    J. Robert Purvis
    Robert G. Winter
    Tim Whiting
Georgia-Pacific Corporation
    John Gildea
    Gordon Iverson
Gold King Mining Co.
Greenpeace USA
Greens Creek Mining Company
    Frank Russell
    H.M. Wimborne
    Samuel R. Smith
Guess & Rudd
Haida Corporation

Haines Cable TV
Haines Chamber of Commerce
Hal-Pac Forest Products, Ltd
Herman Forestry Consulting
Hi-Lites of Native Business
HNS Radio
Homer News
Hoonah Advisory Committee
    Don Foley
    Michael Nigro
    Paul Rudolph
Horizon Magazine
Houston Oil & Minerals Exploration
Hull Cuttings Company
Hyak Mining Company
Hydaburg Advisory Committee
    Adrian LeCornu
    John Morris
    Donald Natkong
    Dorothy Peele
Hyder Advisory Committee
    Dave Stevens
    Ron Tschakert
Hyder Community Assoc.
Idaho State University
Independent Public TV
Info-Juno
Inst. N. Forestry for Serv.
Institute of Northern Forestry
    George R. Sampson
    Leslie A. Viereck
    Tricia Wurtz
Island News
Izaak Walton League
John C. Liberty, Jr.
Journal-American
Juneau Empire
    Lori Evans
    Chuck Kleeschulte
    Kirk McAllister
    Carl Sampson, Editor
Kake Advisory Committee
    Wilbur Brown, Jr.
    Albert Davis
    Morris Grant
    Delbert Kadake
KAKM-TV
KATB-FM
KATV
KBBI Radio
KBYR & KNIK-FM
KCAM Radio
KCAW
KCAW, Raven Radio
KDLG
Kenai Fjords Tours, Inc.
Kenai Peninsula Fishermen's Co-op
Kenai River Sportfishing Assoc
Kendrick Bay Mining Co.
Keni Radio (550)

Kentucky Forest Industries Assoc.
Ketchikan Advisory Committee
    Larry Painter
    Lewis Stamm
    Tim Victorson
Ketchikan Daily News
    Lew Williams, Publisher
    Jason Vondersmith, Reporter
Ketchikan Fish & Game Advisory Com
KFQD Radio
KFSK Radio
KHAR-AM & KKLV-FM
KHNS Radio
KIFW-Radio
KIMO-TV
KINY
KINY-AM
KJFB
KJFP
KJNO
    Bill Sheely
KJUD-TV
    Cara Lee
    Sharon Kale
    News Director
KKGR-AM
Klawock Advisory Committee
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    Rudlph Smith, Sr.
    Don Thomas
    Larry Trumble
    Frank Woods
    William Woods, Sr.
Klawock Cooperative Association
Klukwan Advisory Committee
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    Frank Hugh, Sr.
    Archie Klaney
    Charles Pardee, Sr.
    George Stevens, Sr.
    James Stevens, Sr.
    Gene Strong
Kodiak Cablevision
Kodiak Daily Mirror
Koniag, Inc.
Kotzebue Cablevision
KRBD Radio
KRBD-FM
KRKN-FM (102.1)
KRSA Radio
KRXA
KSRM/KWHQ
KSTK-FM
KSUP
KTKN
KTKN Radio
KTKU-FM
KTNL-TV
KTOO FM
KTOO-FM Alaska Public Radio

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KTVA-TV
KTVF-TV/KCBF
Kuskokwim Fishermen's Cooperative
KYAK-Radio
L and S Mines, Inc.
Lake Superior State College
Lane Community College
Lewis & Clark College
Lindsay, Hart, Neil, and Weigler
Little Squaw Gold Mining Co.
Los Angeles Times
Louisiana State University
Lucky Nell Mining Company
The McIntosh Foundation
Metlakatla Elementary School
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Minerals Exploration Coalition
Minerals Management Service
Donna Cedar
Librarian
Mirror Lake Fishing Club
Mosman Joe Oysters
Mountaineering Club of Alaska
Mukluk News
Mulligan Associates
Narrows Conservation Council
National Audubon Society
National Forest Products Industry
National Rifle Association
National Wildlife Federation
Rick Brown
Martha Tablemen
Natural Resources Defense Council
Natural Resources Management Corp
The Nature Conservancy
NC Machinery
New Alaskan
New York Times
Newbold Consulting
Nicor Mineral Ventures Inc.
No. Flint Hills Audubon Society
Nome Cablevision
Nome Nugget
Noranda Mining & Exploration
North Pacific Fishery Mgmt Council
North Pacific Fishing Vessel Owner
North Star Reporter
Northwest Discovery
Northwest Edition
Northwest Forestry Association
Northwest Marine Charters, Inc.
Northwest Rivers Council
NR Federation of Mineralogical Soc
The Oregonian
Out of Doors in Alaska
Outdoor Empire Publishing Co., Inc
Outdoor Writer Association
OWAA

Pacific Fisheries Leg. Task Force
Pacific Fishing Magazine
Pacific Outdoor Adventures
Pelican Industries
Petersburg Cablevision
Petersburg Fisheries
Petersburg Pilot
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Bill Patrick
Marty Remund
Mim Robinson
Dave Wallin
Prince William Sound
Quail Hill Mining Corporation
R.W. Pavitt and Associates
The Raven
Recreational Equipment Inc.
Rein Design
Resources for the Future
Seafood Producers Cooperative
Sealaska Corporation
Sealaska Heritage Foundation
Sealaska Shareholder
Seattle Journal of Commerce
Seattle Times
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Stanton Patty
Seldovia Native Association, Inc.
Seward Phoenix Log
Sheldon Jackson College
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Sierra Club Alaska Task Force
Sierra Club, Alaska Chapter
Sierra Club, Redwood Chapter
Sitka Advisory Committee
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Sitka Sportman's Association
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Skagway Alaskan
Skagway Cable TV
Skagway News
Snow Mountain Pine Company
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Sonic Cable TV
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Southeast Exposure
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Sumner Strait Advisory Committee
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Timber Press
Tlinget & Haida Fisheries
Tongass Tourism & Recreation
Totem Ocean Trailer Express
Trout Unlimited
Tundra Times
United Cook Inlet Drift Associatio
United Fishermen of Alaska
Stephen Waste
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US Borax
USA Today
Valdez Cablevision
Valdez Historical Society, Inc.
Valley Sun
Voice of America-English Morn. Pro
Wanstall Enterprises
Washington Wilderness Coalition
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Weekly Dial
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Whelans Mining and Exploration
Wilderness Acquisitions, Inc.
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Wrangell Forest Products
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John Schulz
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Martha M. Skrivanek
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Geraldine A. Smith
Clarence Smith
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H. G. Stefan
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CHAPTER 6

BIBLIOGRAPHY

CHAPTER 6

BIBLIOGRAPHY

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2300		Recreation, Wilderness, and Related Resource Management Manual.
	2320	Wilderness Management
2400		Timber Management Manual
	2410	Timber Resource Management Planning
	2420	Timber Appraisal
	2430	Commercial Timber Sales
	2440	Designating, Cruising, Scaling and Accountability
	2450	Timber Sale Contract Administration
	2460	Uses of Timber Other than Commercial Timber Sales
	2470	Silvicultural Practices
2409.12		Timber Cruising Handbook.
2409.13		Timber Resource Planning Handbook.
2409.15		Timber Sale Administration Handbook.
2409.22		Timber Sale Appraisal Handbook.
2409.18		Timber Sale Preparation Handbook.
2500		Watershed and Air Management Manual
	2510	Watershed Planning
	2520	Watershed Protection and Management
	2530	Water Resource Management
	2540	Water Uses and Development

	2550	Soil Management
	2580	Air Resource Management
2509.16		Water Resource Handbook
2509.18		Soil Management Handbook
2509.19		Air Resources Management Handbook
2509.22		Soil and Wataer Conservation Handbook
2509.23		Land System Inventory Handbook
2600		Wildlife, Fish, and Sensitive Plant Habitat Management Manual
	2670	Threatened, Endangered and Sensitive Plants and Animals
2609.24		Aquatic Habitat Management Handbook
2609.25		Subsistence Management and Use Handbook
2700		Special Uses Management Manual
	2720	Special Uses Administration
	2730	Road and Trail Right-of-Way Grants
3400		Forest Pest Management Manual
	3410	Pest Detection
	3420	Pest Management Evaluations
	3430	Forest Pest Management Control Project Standards
	3440	Insurance
	3450	Pest Management Administration
5100		Fire Management Manual
	5110	Wildfire Prevention
	5120	Presuppression Management
	5130	Fire Suppression
	5140	Prescribed Dire
	5150	Fuel Management
	5160	Fire Management Equipment and Supplies
	5170	Fire Management Cooperation
	5180	Fire Reports
	5190	Management
5300		Law Enforcement Manual
5400		Landownership Manual
	5420	Land Purchases and Donations
	5430	Exchanges
	5450	Procedures
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36 CFR 228	Minerals
36 CFR 251	Land Uses
36 CFR 254	Land Ownership Adjustments
36 CFR 261	Prohibitions
36 CFR 295	Use of Motor Vehicles Off Forest Development Roads
40 CFR 233	Best Management Practices
40 CFR 241	Guidelines for the Land Disposal of Solid Waste

40 CFR 257	Criteria for Classification of Solid Waste Disposal and Practices
40 CFR 1500 et seq	National Environmental Policy Act
43 CFR 2561	Native Allotments
43 CFR 2627	Alaska - Grants
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(18 AAC 15.020-.310)

Article 6. General Provisions
(18 AAC 15.900-.920)

Water Quality Standards, Chapter 70
(18 AAC 70.010-.110)

CHAPTER 7

GLOSSARY OF TERMS

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A

Adfluvial Fish	Species or populations of fish that do not go to sea, but live in lakes, and enter streams to spawn.
Adjudicate	To settle in the exercise of judicial authority. To determine finally. (Black. 1979, Black's Law Dictionary).
Airshed	Geographical areas, which because of topography, meteorology, and climatic conditions, share the same air mass. Management of air quality is done by airshed.
Alaska Heritage Resource Survey (AHRS)	The official list of cultural resources in the State of Alaska, maintained by the Office of History and Archaeology, Alaska Division of Parks and Outdoor Recreation.
Allowable Sale Quantity (ASQ)	The maximum harvest volume that may be scheduled during the plan period to meet long-term production while providing for other resource objectives.
Alluvial	A soil developing in rock fragments or soil material deposited by running water and exhibiting essentially no horizon development or modification of the recently deposited materials.
Alluvial Fan	A body of alluvium material, with or without debris flow deposits, whose surface forms a segment of a fan-shaped cone that radiates downslope from the point where the stream emerges from a narrow valley into a less-sloping surface.
Alpine	Alpine refers to parts of mountains above tree growth or to organisms living there.
Ambient Air Quality Standards	The prescribed level of pollutants in the outside air that cannot by exceeded legally during a specified time in a specified geographical area.
Amenity	Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value typically describes those resource properties for which market values (or proxy values) are not or cannot be established.
Anadromous Fish	Fish which mature and spend much of their adult life in the ocean, returning to inland waters to spawn. Salmon and steelhead are examples.

ANCSA	The Alaska Native Claims Settlement Act of December 18, 1971. Public Law 92-203, 92nd Congress, 85 Stat. 688-716.
ANILCA	The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551.
Appropriation of Land	The act of selecting, devoting, or setting apart land for a particular use or purpose, such as where land is appropriated for public buildings and military reservations or other public uses (Black, 1979).
Aquaculture	Maintaining, enhancing, and rehabilitating fish stocks through improvements and facilities, including the rearing of anadromous juvenile fish, generally in fresh water, for release into salt water for maturing, to become available as a common property resource.
Aquatic Ecosystem	A stream channel, lake or estuary bed, the water itself, and the biotic communities that occur therein.
Aquatic Farm	(or Aquafarming) - Growing, farming, or cultivating aquatic farm products in captivity or under positive control. Current State of Alaska law (AS 16.40.100 - 16.40.199, July 1, 1990), does not allow the aquatic farming of finfish.
Area of Potential Effects	The geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.
Associated Grave Goods	The items placed with human remains at the time of interment.
Atmospheric Dispersion	The lofting and distribution of particulate matter from wood smoke into the atmosphere over time.

B

Background	The distant part of a landscape. The seen, or viewed, area located from three or five miles to infinity from the viewer.
Bedload	Sand, silt, and gravel, or soil and rock debris carried by a stream on or immediately above its bed. The particles of this material have a density or grain size which prevents movement far above or for a long distance out of contact with the streambed under natural flow conditions.
Best Management Practices (BMP's)	The set of practices which, when applied during implementation of a project ensures that water-related beneficial uses are protected and that State Water Quality Standards are met.
Process	Custom fit practices, measures, or methods developed for projects through inventory and analysis, and interdisciplinary involvement.

Standard	Established or "fixed" methods, measures, or methods that are applied to projects.
Biomass	The total quantity, at a given time, of living organisms of one or more species per unit area or all of the species in a community.
Bole	Trunk of the tree. A tree stem once it has grown to substantial thickness - roughly to that capable of yielding poles, sawlogs, or veneer logs.
Boulders	Rounded or angular rocks greater than 12 inches in size.

C

Channel	(Watercourse) - An open conduit, either naturally or artificially created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. River, creek, run branch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.
Channel Braiding	Development of channels by the stream or river that interweave as a result of repeated double branching and convergence of flow around interchannel bars, resembling in plan the strands of a complex braid.
Channel Migration	Movement of the stream or river channel within a floodplain area usually over an extended period of time.
Channel Type	A means of distinguishing parts of a stream system into segments which have fairly consistent physical and biological characteristics. For descriptions, see "Channel Type Field Guide," Publication R10-MB-6.
Claim	To demand as one's own or as one's right; to assert; to urge;, to insist (Black 1979).
Clearance (cultural resources)	Certification by the Forest Supervisor documenting that the requirements of 36 CFR 800 have been fully met for each undertaking.
Clearcut	Harvesting method in which all trees are cleared in one cut. It prepares the area for a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class in planning.
Coarse Gravel	In soils, coarse gravel which are rounded rocks generally 3/4 of an inch to 3 inches in size.

Cobbles	Rounded rocks between 3 and 12 inches in size.
Colluvial	A soil developing in a deposit of rock fragments and soil material accumulated on slopes or at the base of steep slopes as a result of gravitational action.
Commodities	Resources with commercial value; all resource products which are articles of commerce, such as timber and minerals.
Common Variety Minerals	Deposits of sand, stone, gravel, and others of widespread occurrence not having distinct special value. These deposits are used generally for construction and decorative purposes and are disposed of under the Materials Act of 1947.
Confined Streams	(Stream channel). Streams that are confined within their channel banks; controlled by stream incision, geomorphic landform characteristics, and local geological conditions.
Confluence	The point where two streams meet.
Convey	To pass or transmit the title to property from one to another. (Black 1979)
Conveyance	An instrument by which some estate or interest in lands is transferred from one person to another. (Black 1979)
Created Opening	Openings in the Forest canopy created by silvicultural practices including shelterwood regeneration cutting, clearcutting, seed tree cutting, or group selection cutting.
Critical Habitat	Specific areas within the geographical area occupied by threatened or endangered species, on which are found those physical and biological features that are essential to conservation of the species and which may require special management considerations or protection.
Crown	The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.
Culmination Mean Annual Increment (CMAI)	The point at which the volume increment for a tree or stand of trees has achieved its highest mean value. Mean annual increment is based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan.
Cultural Descendant	A person who, although not necessarily a direct descendant of a particular deceased person, is associated with a cultural religious tradition to which the human remains of the deceased person has significance.
Cultural Resources	The physical remains of districts, sites, structures, buildings, networks, events, or objects used by humans in the past. They may be historic, prehistoric, architectural, or archival in nature. Cultural resources are nonrenewable aspects of our national heritage.

D

Debris flows	A category of mass movement that is of unconsolidated material exhibiting a continuity of movement and a plastic or semi-fluid behavior resembling that of a viscous fluid.
Debris slides	The rapid downslope movement of a mixture of soil, rock, and forest litter with or without a relatively high water content. Also known as debris avalanches.
Debris torrents	Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris. Debris torrents are usually confined within the stream channel until they reach the valley floor where the debris spreads out, inundating vegetation and forming a broad surface deposit.
Decks	Cut timber, sawlogs, or cull logs that have been removed from logging units and stacked.
Detritis	The heavier mineral debris moved by natural watercourses, usually in bed-load form.
Developed Recreation	That type of recreation that occurs where modifications (improvements) enhance recreation opportunities and accommodate intensive recreation activities in a defined area.
Diameter at Breast Height (DBH)	The diameter of a standing tree at a point four feet, six inches from ground level.
Discharge Velocity	The speed of water outflow over a given period of the time from a stream or river.
Dispersed Recreation	That type of recreation use that requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with it. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking, and many others.
Dissected Landforms	A physical, recognizable form or feature of the earth's surface such as a mountain, hill, or valley, having a characteristic shape, that in part is the result of several shallow or deeply incised drainage channels.
Dissolved oxygen	The amount of free (not chemically combined) oxygen in water.
Distance Zone	Areas of landscapes denoted by specified distances from the observer (foreground, middleground, or background). Used as a frame of reference in which to discuss landscape characteristics of management activities.

Diversity	The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.
Duff layer	The general term for vegetation material covering the mineral soils in forests including the fresh litter and well-decomposed organic material and humus.

E

Ecosystem	A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).
Ecotone	A transition or junction zone between two or more naturally occurring diverse plant communities (ecosystems).
Ecotype	A species of plant or animal that displays different genetic or physiological adaptations. For example, the brown bear in southeast Alaska is the same species as the grizzly bear in interior Alaska, but the brown bear is smaller than the grizzly.
Effect (cultural resources)	The potential of an undertaking to alter the characteristics that may qualify a property for inclusion in the National Register of Historic Places.
Emergent	Plants that begin standing at least until the beginning of the next growing season (cattails).
Encumbrance	Any right to, or interest in, land which may subsist in another to diminution of its value, but consistent with the passing of the fee. A claim, lien, charge, or liability attached to and binding real property. (Black 1979)
Entitlement	Right to benefits, income or property which may not be abridged without due process. (Black 1979)
Environmental Impact Statement (EIS)	A document prepared by a federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form, and then in a final form. An impact statement includes the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts which cannot be avoided by the action, (3) the alternative courses of actions, (4) the relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.
Ephemeral channels	A stream that flows only in direct response to precipitation, and thus discontinues its flow during dry seasons. Its channel is above the level of the water table.

Equipment fires	Those wildfires that have their origin from the use of equipment in forest operations such as logging, yarding, chainsaw use, land clearing, road building, etc.
Erosion	The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep, detachment and movement of soil or rock by water, wind, ice, or gravity.
Estuarine	Deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.
Evapotranspiration	The sum total of water lost from the land by evaporation and plant transpiration. Transpiration is loss of water in vapor form from a plant.
Even-aged Management	The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together.
Executive Order	An order or regulation issued by the President or some administrative authority under his direction for the purpose of interpreting, implementing, or giving administrative effect to a provision of the Constitution or of some law or treaty.
Existing Data Search	A systematic check and evaluation of available records, documents, and informant sources to gather information pertinent to cultural resources within a given area.
Existing Visual Condition (EVC)	EVC ratings are established to give the land manager an indication of the current level of visual quality and visual evidence of management activities. EVC classes are as follows: *Type 1*: Appears to be untouched by human activities, except for trails needed for access; only ecological changes have occurred. *Type 2*: Changes in the landscape are not noticed unless pointed out. *Type 3*: Changes in the landscape are noticed as minor disturbances, but the natural appearance of the landscape remains dominant. *Type 4*: Changes in the landscape are easily noticed and perceived as disturbances, but resemble natural patterns. *Type 5*: Changes stand out as a dominant impression on the landscape, yet are shaped to resemble natural patterns from 3-5 miles or more distant. *Type 6*: Changes are in glaring contrast to the landscape's natural appearance; excessive visual alteration has occurred.

F

Facility	A single or contiguous group of improvements that exists to shelter or to support Forest Service programs.

Fire Severity	The amount of heat over a given area that is measured by period of residence time of the flaming front divided by the smoulder time of the fire. Severity is important to monitor for duff layer consumption, tree root damage, and possible soil damage.
Fire Suppression	All the work of extinguishing or confining a fire, beginning with its discovery.
Fiscal Year	October 1 to September 30. The year assigned is that of the calender year which begins on January 1.
Flash Flooding	A very rapid responding, relatively high streamflow overtopping the natural or artificial banks in any reach of a stream.
Floodplain	The nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream or river.
Footslope	The geomorphic component that forms the inner, gently inclined surface at the base of a hill or mountain slope. The surface profile is dominantly concave, and in terms of gradation process, it is the transition zone between upslope erosional sites and downslope depositional sites.
Forest Plan	Source of management direction for an individual Forest specifying activity and output levels for a period of 10-15 years. Management direction in the plan is based on the issues identified at the time of the plan's development.
Forested Wetland	A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.
Forest-wide Direction and Standards/Guidelines	Establish the environmental quality, natural renewable and depletable resource requirements, conservation potential, and mitigation measures that apply to several management area prescriptions.
Fuel	The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees, dead woody materials, etc.
Fuel Loading	The volume of the available or burnable fuels in a specified area.

G

Genetic Descendant	A person known or reliably assumed to have a genetic relationship to a deceased person.
Glacial Refugia	The areas of Southeast Alaska that were not covered by glaciers during the last ice age.

Glacial Rivers and Streams	Rivers and streams that receive their main flow characteristics from the presence and activities of ice and glaciers and melt water from them.
Glide or Placid Streams	Grouping of channel types (L1 and L2) that have fairly consistent physical characteristics occurring on lowland landforms and are mostly associated with bogs, marshes, or lakes.
Groundwater	Water within the earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled - the upper surface level forms the water table.
Group Selection	A harvesting method to develop and maintain uneven-aged stands by the removal of small groups of trees to meet a predetermined goal of size distribution and species composition in remaining stands.

H

Historic Property	Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. The term includes artifacts, records, and remains that are related to and located within such properties.
Human Remains	The physical remains of human bodies.
Hydrologic cycle	The complete cycle through which water passes, commencing as atmospheric water vapor, passing into liquid and solid form as precipitation, thence along or into the ground surface, and finally again returning to the form of atmospheric water vapor by means of evaporation and transpiration. Also called Water Cycle.
Hydrophyte	Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

I

Ignition	The initiation of combustion.
Implementation (cultural resources)	That point in an undertaking when the proponent has full and complete authorization to proceed with the undertaking.
Integrated Pest Management (IPM)	A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed.
Intensity	A measure (in BTU's per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.

interceptions
The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus stemflow and throughfall.

interest (in land)
A general term to denote a right, claim, title, or legal share in real estate. (Black 1979)

Interdisciplinary Team (IDT)
A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Invertebrate population
That population of creatures without a backbone. Context would depict whether land invertebrates, shore invertebrates, or water invertebrates. Most forest connotations deal with the insect populations.

invertebrates
Animals lacking spinal columns.

irretrievable
Applies to losses of production, harvest, or use of renewable natural resources.

irreversible
A term that describes the loss of future options. Applies primarily to the use of nonrenewable resources such as minerals or cultural resources, or to those factors which are renewable only over long time spans, such as soil productivity.

L

Lacustrine
Wetlands - includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salinities of less than 0.5 percent. Typically, there are extensive areas of deep water and there is considerable wave action.

Land Exchange
The conveyance of non-Federal land or interests to the United States in exchange for National Forest System land or interests in land.

Land Use Designation (LUD)
General management prescriptions applied to a Value Comparison Unit or group of Value Comparison Units. These land use designations are as follows.

LUD 1
Forest Service recommended Wilderness areas, most of which became Wilderness through the Alaska National Interest Lands Conservation Act. In general, these undeveloped areas are managed for solitude and primitive types of recreation, and contain unaltered habitats for plants and animal species. These areas are managed as directed in the 1964 Wilderness Act, as amended.

LUD 2

Lands under this designation are managed in a roadless state to retain their wildland character. Primitive recreational facilities can be built and habitat improvements for fish and wildlife are permitted. Timber harvest on these lands is limited to salvage operations to protect other resources.

LUD 3

These lands are managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives.

LUD 4

These lands are managed to provide opportunities for intensive development of resources. Emphasis is primarily on commodity, or market resources and their use. Amenity values are also provided for. When conflicts over competing resource uses arise, conflicts would most often be resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.

Land Utilization Project

A unit designated by the Secretary of Agriculture for conservation and utilization under Title III of the Bankhead-Jones Farm Tenant Act. (USDA Forest Service, undated, Land Areas of the National Forest System)

Landform

Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes. Major forms included are plains, plateaus, and mountains; minor forms are hills, valleys, slopes, eskers, and dunes.

Landslides

Landslides are a mass-wasting process involving moderately rapid to rapid downslope transport of soil and rock materials, by means of gravitational stresses. This mass of rock and soil may or may not be water-saturated.

Large Woody Debris

Any large piece or relatively stable woody material in a stream or river, having a diameter of four inches or greater and a length greater than three feet, that intrudes into a stream channel. Synonyms are LWD, wood debris, log. Former term was large organic debris.

Leasable Minerals

Those minerals which are disposed of under authority of the various mineral leasing acts. Minerals include coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

Leave Strips

The result of timber harvest activities where blocks of timber are left after harvest has occurred.

Lifeform

Any living entity, animal, or plant.

Locatable Minerals

Those minerals which are disposed of under the general mining laws. Included are minerals such as gold, silver, lead, zinc and copper which are not classed as leasable or salable.

Log Transfer Facility (LTF)	Formerly referred to as Terminal Transfer Facilities, Log Transfer Facilities include the industrial site and facilities (structure) used for moving logs and timber products from land-based transportation forms to water-based transportation forms.
Lows	Atmospheric disturbances that can properly be considered as storms, for they bring changeable, unsettled weather that normally includes widespread, abundant, and often, intensive precipitation.

M

Macrophytes	Any plant species that can be readily observed without the aid of optical magnification.
Management Area	As defined in the first Tongass Land Management Plan: Combinations of Value Comparison Units having common management direction. As defined in the Forest Plan Revision: An aggregation of areas which have common management direction and may be noncontiguous in the Forest.
Management Indicator Species (MIS)	Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.
Management Prescription	Management practices and intensity selected and scheduled for application on a Management Area to attain multiple-use and other goals and objectives.
Mariculture	The cultivation of plants and animals in saltwater, with no freshwater component. Mariculture does not include anadromous fish farming.
Marine Systems	Consists of the open ocean overlying the continental shelf and its associated high-energy coastline; may be the open ocean itself, or the water regimes are determined primarily by the ebb and flow of the ocean tides. These also include shallow coastal indentations of bays without appreciable freshwater inflow.
Maritime Climate	The aggregate of day-to-day weather conditions that include widespread abundant precipitation and temperatures that do not vary a great deal from winter to summer.
Mass Movement	Dislodgement and downslope transport of earth material as a unit under direct gravitational stress. The process includes slow displacements such as soil creep in dry or water-saturated condition, rapid movements such as landslides, rock slides and falls, earthflows, debris flows, and avalanches.
Memorandum of Understanding	A legal agreement between the Forest Service and non-Federal agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.

Microclimate	The climatic condition of a small area resulting from a modification of the general climatic conditions by local differences in elevation and exposure.
Middleground	The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape. The area is located from 1/4 to 5 miles from the viewer.
Mineral Entry	The filing of a mining claim on Federal land to obtain the right to mine any locatable minerals it may contain. Also the filing for a mill site on Federal land for the purpose of processing off-site locatable minerals.
Mineral Exploration	The search for valuable minerals.
Mineral Production	The extraction of mineral deposits.
Mineral Soils	Soils consisting predominantly of, and having its properties determined by, mineral matter. These soils usually contain less than 20 percent organic matter, but can contain an organic surface layer up to within 20 inches of the surface.
Mineral Withdrawal	A formal designation by the Secretary of Interior which precludes entry or disposal of mineral commodities under the mining and/or mineral leasing laws.
Mining Claims	A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.
Mitigate	To lessen or make minimal the severity.
Mixed Conifer	In Southeast Alaska, mixed conifer stands usually consist of the following species: western hemlock, mountain hemlock, Alaska yellow-cedar, red-cedar, and Sitka spruce. Shorepine may occasionally be present depending on individual sites. Redcedar is not usually in mixed conifer stands on the Chatham or Stikine areas.
Moderately well-drained soils	Water in these soils is removed from them somewhat slowly, so that the profile is wet for a small, but significant, part of the time. Soils within this drainage class do not have mottles that have chroma of 2 or less within 20 inches.
Moisture regime	The variation of moisture content in a specified portion of soil during the year.
Monitoring and Evaluation	The periodic evaluation on a sample basis of Forest Plan management practices to determine how well objectives have been met and how closely management standards have been applied.
Mop-up	Following suppression activities to stop the spread of the fire, the business of extinguishing the fire is called mop-up.
Muskeg	A muskeg in Southeast Alaska is a type of bog that has developed over thousands of years in depressions, or flat areas on gentle to steep slopes.

These bogs have poorly drained, acidic, organic soils materials that support vegetation that can be either sphagnum moss or herbaceous plants or sedges, rushes, and forbs or may be a combination of sphagnum moss and herbaceous plants. These vegetation types may have a lesser abundance of shrubs and stunted trees.

N

National Forest
A unit formally established and permanently set aside and reserved for National Forest purposes. (USDA Forest Service, undated, Land Areas of the National Forest System).

National Forest System
A Nationally significant system of Federally owned units of Forest, Range, and related land consisting of National Forests, Purchase Units, National Grasslands, Land Utilization Project Areas, Experimental Forest Areas, Experimental Range Areas, designated Experimental Areas, other land areas, water areas, and interests in lands that are administered by the Forest Service or designated for administration through the Forest Service. (USDA Forest Service, undated, Land Areas of the National Forest System)

National Grassland
A unit designated "National Grasslands" by the Secretary of Agriculture and permanently held by the Department of Agriculture under Title III of the Bankhead-Jones Farm Tenant Act. (USDA Forest Service, undated, Land Areas of the National Forest System)

No Adverse Effect (cultural resources)
When the "Effect" on a cultural resource would not be considered harmful to those characteristics that qualify the property for inclusion in the National Register.

O

Off-Highway Vehicle
A general term describing vehicle types such as motorbikes, minibikes, trailbikes, snowmobiles, dunebuggies, all-terrain vehicles, and four-wheel drive, high clearance vehicles (FSM 2355.01). Sometimes referred to as "OHV's"

Off-Road Vehicle
Synonymous with off-highway vehicle (FSM 7709.55, Section 34). Sometimes referred to as "ORV's.

Order Three Inventory
A level of soil surveys made for extensive land uses that do not require precise knowledge of small areas or detailed soils information. Such survey areas are usually dominated by a single land use and have few subordinate uses. This information can be used in planning for range, forest, recreational areas, and similarly extensive land uses and in community planning.

Order Four Inventory
A soil survey level made for extensive land uses that require general information for broad statements concerning land-use potential and general land management. This information can be used in locating, comparing,

	and selecting suitable areas for major kinds of land use in regional land-use planning, and in selecting areas for more intensive study and investigation.
Organic Soils	Soils which contain a high percentage (greater than 15 percent) of organic matter throughout the soil depth.
Overflow	High runoff which overflows natural stream and river banks. Also known as flooding.
Overselection	Unconveyed lands selected in excess of entitlement. Overselections by the State of Alaska are authorized in Section 906 (f), ANILCA. They are authorized for Native Corporations organized under ANCSA in Federal Regulations (43 CFR 2650).

P

Palustrine	A wetland system that includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands which occur in tidal areas where salinity, due to ocean-derived salts, is less than 0.5 percent.
Parent Material	The unconsolidated, and more or less chemically weathered, mineral or organic matter from which soils develop.
Parts per Million	Is a measurement of concentration indicating the quantity of a substance per unit volume of a solution.
Peak flow	The highest discharge recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flows. Also called maximum flow.
Positive Control	For mobile species, enclosed within a natural or artificial escape-proof barrier; for species with limited or no mobility, such as a bivalve or an aquatic plant, "positive control" also includes managed cultivation in unenclosed water (Laws of Alaska, 1988, HCS CSSB 514(Rls), Chapter No. 145, Section 16.40.199).
pH	The degree of acidity or alkalinity of a soils at a specified soil-water ratio, and expressed in terms of the pH scale.
Plant communities	Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.
Poorly drained soils	Water in these soils is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Population viability	Ability of a population to sustain itself.
Prescribed Fire	A wildland fire burning under preplanned, specific conditions to accomplish specific land and resource objectives. It may result from either a planned or unplanned ignition.
Preservation	A technique of conservation which maintains the resource in or on the ground in perpetuity.
Primary Succession	Vegetation development is initiated on newly formed soils or upon surfaces exposed for the first time (as by landslides) which have, as a consequence, never borne vegetation before. Any succession beginning on a bare area not previously occupied by plants or animals.
Process Group	A combination of similar channel types based on major differences in landform, gradient and channel shapes.
Proponent	An agency, institution, individual, etc. applying to perform an activity on National Forest System lands under authority of a mining plan of operation, contract, license, special use authorization or other agreement.
Purchase Unit	A unit designated by the Secretary of Agriculture or previously approved by the National Forest Reservation Commission for purposes of Weeks Law acquisition. (USDA Forest Service, undated, Land Areas of the National Forest System)

R

Reburial and Reinterment	The replacement of disinterred human remains into the ground or otherwise disposing of such remains in a manner likely to approximate the wishes of the deceased (e.g., placement in burial caves, legal cemeteries, surface mortuary structures, or cremation where traditionally practiced).
Recreation Opportunity Spectrum (ROS)	A system for planning and managing recreation resources that categorizes recreation opportunities into seven classes.
Primitive	A natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.
Semi-Primitive Motorized	A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Local roads used for other resource management activities may be present.
Semi-Primitive Non-Motorized	A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Use of local roads for recreational purposes is not allowed.

Roaded Natural	A natural-appearing environment with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.
Roaded Modified	A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.
Rural	A natural environment that has been substantially modified by development of structures, vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.
Recreation Places	Identified geographical areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.
Reducing Soil Condition	An environment in the soil conducive to the removal of oxygen and chemical reduction of ions caused by saturated soil conditions.
Relinquish	To abandon, to give up, to surrender, to renounce some right or thing. (Black 1979)
Research and Experiment Area	A unit reserved and dedicated by the Secretary of Agriculture for forest or range research and experimentation. (USDA Forest Service, undated, Land Areas of the National Forest System)
Research Design	A statement of work to be done toward a particular goal. The research design details what will be done, how it will be done, what is required to do it, and why it is important or useful to do the work .
Research Natural Area (RNA)	An area in as near a natural condition as possible, which exemplifies typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for scientific and educational purposes; commercial and most public uses are not allowed.
Resident Fish	Fish that are not migratory and complete their entire life cycle in fresh water.
Retention	The amount of commercial forest land removed from the timber base to protect other resource values by providing stands of timber with a wide range of biologic qualities and quantities.
Riffles	Shallow rapids in an open stream, where the water surface is broken into by waves by obstructions wholly or partially submerged.
Riparian Area	Geographically delineable areas with distinct resource values and characteristics that are comprised of the aquatic and riparian ecosystems.

Riparian Area Management	Areas with distinctive resources values and characteristics that are comprised of aquatic and riparian ecosystems or adjacent upland areas that have direct relationships with the aquatic ecosystem in the absence of a riparian ecosystem. This area as a minimum is one hundred horizontal feet in distance from all sides of perennial streams, lakes, and other bodies of fresh water, or to the recognizable area dominated by associated riparian ecosystem (vegetation and soil), whichever is greater.
Riparian Ecosystem	A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.
Riverine System	A category level in wetland classification which includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent.
Rotation	The planned number of years between the formation or the regeneration of a crop or stand of trees and its final cutting at a specified stage of maturity.
Rotation Age	The age of a stand when harvested at the end of a rotation.
Rubble	All accumulations of loose angular rock fragments, commonly overlying outcropping rock.

S

Saturated Soils	Soil condition where all the spaces between soil particles are filled with water.
Scrub-Shrub Wetland	Includes wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.
Second-Growth	Forest growth that has come up naturally or has been planted after some drastic interference (for example, clearcut harvest, serious fire, or insect attack) with the previous forest growth.
Secondary Succession	The process of vegetation re-establishment after a normal succession is disrupted by fire, cultivation, lumbering, windthrow, or any similar disturbance.
Sediment	Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity, or ice.
Sensitive Species	Those plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Species that have appeared in the Federal Register as proposed for classification and are under consideration for

official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional Forester as needing special management to prevent their being placed on Federal or state lists.

Sensitive Travel Route — A road system or marine water way which receives a moderate to high degree of use by the public, both Alaskan residents and tourists.

Sensitivity Level — A measure of the people's concern for the scenic quality of the National Forest applied to travel routes, use areas, and water bodies.

Sensitivity Zone — A body of land which has been classified on the basis of cultural and environmental data, as having a high, medium, or low likelihood/probability for containing cultural resources.

Shelterwood Cutting — The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

Silviculture Method — A management process whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the process (See single-tree selection, shelterwood cutting, group selection, even age management, uneven age management, and clearcut).

Single-tree Selection — A cutting method to develop and maintain uneven-aged stands by removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

Slash — The wood residue left on the ground after harvesting, cultural operations, windstorms, fire, or road building. It includes unused logs, uprooted stumps, broken or uprooted stems, tops, branches, and leaves.

Slough — A section of an abandoned river channel containing stagnant water and occurring on a floodplain or delta.

Smolt — A young silvery-colored salmon or trout which moves from freshwater streams to saltwater.

Snag — A standing dead tree usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil Drainage — The rapidity and extent of the removal of water from the soil, in relation to additions especially by surface runoff and by flow through the soil to underground spaces.

Soil Mass Movement — See mass movement

Soil Resource Inventory — The systematic examination, description, classification, and mapping of soils in an area.

Somewhat Poorly Drained Soil

Water in the soil is removed from the soil slowly enough to keep it wet for significant periods but not all of the time. Mottling generally occurs deeper than 10 inches from the soil surface.

Special-Use Permit

A permit issued under established laws and regulations to an individual, organization, company, local, state, or federal government agency for occupancy or use of National Forest land for some special purpose. Examples include uses of National Forest System land, improvements and resources except those provided for in Forest Service Regulations for timber, minerals, and livestock.

Stabilization (cultural resources)

The process of arresting the deterioration of a damaged cultural resource in order to prevent further damage from occurring. Stabilization may include reconstructing portions of the cultural resource.

State Historic Preservation Officer (SHPO)

The official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act of 1966, as amended, to administer the the State Historic Preservation Program.

Stream Biological Production

Includes all levels of productivity: primary, secondary, and higher levels of production. Higher levels of production result from animals consuming secondary or any higher levels of production. For example, fish consuming other fish.

Primary Production

Results from photosynthesis by green plants. In streams includes production from algae and aquatic plants, and from non-stream sources such as leaf litter.

Secondary Production

Results from consumption by animals of materials produced in primary production in streams; this includes production of macroinvertebrates and some fish species.

Stream Class

A means to categorize stream channels based on their fish production values. There are three stream classes on the Tongass National Forest. They are:

Class I:

Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II:

Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III:

Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Stream Order — First order streams are the smallest unbranched tributaries; second order streams are initiated by the confluence of two first order streams; third order streams are initiated by the confluence of two second order streams, and so on.

Substrate — The size of rock in the bed (bottom) of rivers and streams.

Suitable Forest Land — Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

Suspended Sediment — The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

T

Temporary Facility — Any structure or other man-made improvement which can be readily and completely dismantled and removed from the site when the authorized use terminates.

Tentatively Suitable Forest Land — Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Terrestrial ecosystems — Vegetative communities relating to the influence of land (non-wetland) as distinct from those predominantly influenced by water (wetlands).

Thinning — The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may be done at two different stages:

Precommercial Thinning — Removing trees that are too small to make a merchantable product. to improve tree spacing and promote more rapid growth.

Commercial Thinning — Removing trees that have reached sufficient size to be manufactured into a product to improve tree spacing and promote more rapid growth.

Threatened and Endangered Species Species identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act, as amended.

Tiering Refers to the elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.

Timber Harvest Schedule The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan.

Timber Stand Improvement (TSI) All noncommercial intermediate cuttings and other treatments to improve composition, condition, and volume growth of a timber stand.

Top Filing The filing of a future selection application by the State of Alaska, subject to valid existing rights, for lands which are not available for selection on the date of filing. If otherwise valid, these applications become an effective selection, without further action by the state, upon the date included lands become available for selection. Top filings for the State of Alaska are authorized by Section 906(e), ANILCA

Total Stream Discharge Total water outflow from stream or river.

Traffic Service Level (TSL) A description of the significant traffic characteristics and operating conditions of a road. Local roads will normally be "C" or "D"; collectors, "B" or "C"; and arterials, "A" or "B".

Transportation and Utility System (TUS) Significant corridors, with their associated sites used to accommodate public transportation and energy transmission needs.

Transportation and Utility System Avoidance Area An area where the establishment and use of transportation or utility corridors and sites is not desirable given the management area emphasis. A search for "*windows*" should be exhausted before TUS facilities are considered in avoidance areas. When practical, these areas should be avoided through site-specific analysis during project-level planning. Avoidance areas often include Congressionally and administratively designated areas. Although special environmental and procedural considerations may be required for these areas, these special designations do not preclude consideration and use as a TUS. Avoidance areas are designated through the allocation of lands to management prescriptions specifically identified as TUS avoidance areas in their standards and guidelines.

Transportation and Utility System Exclusion Area A large area (large enough to cause significant barriers) which legislatively precludes transportation and utility systems.
Due to special authorities provided in Title XI, ANILCA, there will be no exclusion areas on the Tongass.

Transportation and Utility System Window An area potentially available for the location of transportation or utility corridors and sites. *Windows* represent areas of future opportunity where the applied management direction will not conflict with future designation of TUS. A site-specific analysis is still required during project-level

planning, to identify resource protection needs within these areas. *Windows* are designated through allocation of lands to TUS windows and their standards and guidelines.

Transportation/Utility Corridor

A linear strip of land identified for the present location of transportation or utility rights-of-way within its boundaries. (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning)

Trust

A right of property, real or personal, held by one party for the benefit of another (Black 1979).

Turbidity

An expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a water sample; turbidity in water is caused by the presence of suspended matter such as clay, silt, finely divided organic and inorganic matter, plankton, and other microscopic organisms.

U

Unconfined Streams

Streams that due to lack of stream incision, and effects of geomorphic landform characteristics and local geologic conditions result in streams overflowing their banks, changing flows to other channels, and establishing new channels during flood conditions.

Undertaking (cultural resources)

Any project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal Agency or be licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106, National Historic Preservation Act of 1966, as amended.

Uneven-Aged Management

The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products.

Unsuppressed

A fire that remains unextinguished or unconfined. The spread has not been halted.

Utilization Standards

Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (DBH) and top of the tree inside the bark (top DIB) and the percentages of "soundness" of the wood.

V

Valid

Having legal strength or force, executed with proper formalities, incapable of being rightfully overthrown or set aside (Black 1979)

Valley

An elongated, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.

Valley bottom

A general term for the nearly level to gently sloping part of a valley. Also referred to as the valley floor.

Value Comparison Unit (VCU)

A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

Vegetation Release

The freeing of vegetation (grass, forbs, brush, trees) by eliminating the competition for nutrients, water, and sunlight. Once competition for these items has been eliminated, subdued, or stagnated, vegetation will display vigor and growth.

Very Poorly Drained Soils

Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites and are frequently ponded.

Viable Population

A population which has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population in the planning area.

Viewshed

An expansive landscape or panoramic vista seen from a road, marine water way or specific viewpoint.

Visual Absorption Capability (VAC)

The ability of the landscape to absorb management activities. Landscapes are rated with high, moderate or low abilities to absorb management activities. These ratings reflect the degree of landscape variety in an area, viewing distance and topographic characteristics. As an example, steep, evenly sloped landscapes viewed in the foreground to middleground are typically given a low VAC rating.

Visual Quality Objective (VQO)

A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Preservation

Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.

Retention	Management activities are not evident to the casual Forest visitor.
Partial Retention	Management activities may be evident, but are subordinate to the characteristic landscape.
Modification	Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).
Maximum Modification	Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

W

Watershed	Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.
Third Order Watershed	A watershed where there are 2 major branches to the mainstream of the watershed.
Fourth Order Watershed	A watershed where there are 3 major branches to the mainstream of the watershed.
Water Table	The upper surface of the ground water or that level below which the soil is saturated with water.
Well Drained Soils	Water is removed from the soil readily, but not rapidly. These soils are free of mottlings.
Wetlands	Those areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include muskegs, marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs.
Wildfire	Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.

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